

DRAFT - Traffic Impact Study

First & Main, Blacksburg
Town of Blacksburg, Virginia



Prepared for:
Fairmount Properties
Cleveland, Ohio

April 23, 2007



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Blacksburg, VA

JN 22559.41

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Executive Summary

Overview

This study was prepared for Fairmount Properties by Anderson & Associates, Inc. (A&A) to evaluate possible traffic impacts that may result from the proposed commercial development on South Main Street in the Town of Blacksburg, Virginia. The proposed development is a mix of commercial and retail uses including restaurants, various retail shops, a movie theater complex, and a pharmacy. It is anticipated that the build-out year for the development will be 2008. This study is based on the proposed site plan for the development prepared by CMH Architects, dated March 20, 2007.

Discussion

Based on peak hour intersection turning movement counts and roadway tube counts collected by A&A in November of 2004, analyses were performed to determine the possible impacts of the proposed development on the intersections listed in the table below. VDOT historical traffic information was reviewed and used along with the counts obtained by A&A to determine a growth rate to use in developing future traffic volumes. Based on this review, a 1.75% annual growth rate was applied to the existing traffic volumes to estimate anticipated build-out traffic volumes. The site traffic used in the analyses was based on the proposed site plan for the development and traffic generated using the Institute of Transportation Engineers (ITE) Trip Generation Manual. Summary Table 1 shows analysis results for peak hour traffic volumes that result in the longest delay and highest LOS for each intersection.

Summary Table 1	2004 Existing Traffic		2007 Projected Traffic		2008 Background Traffic		2008 Build-out Traffic	
Intersection	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Airport Rd & Country Club Dr	12.0	B	12.7	B	13.1	B	14.5	B
Country Club Dr & South Main St*	12.5	B	13.1	B	13.3	B	20.6	C
Kroger / CVS & South Main St*	10.1	B	11.6	B	11.5	B	12.0	B
Ardmore St & South Main St	19.4	C	21.3	C	21.8	C	14.3*	B*
Landsdowne St & South Main St	21.3	C	23.4	C	23.9	C	28.4	D
Marlington St & South Main St	24.6	C	27.5	D	29.4	D	12.4*	B*
King St / Wendy's & South Main St	40.9	E	47.9	E	52.2	F	67.3	F
Hubbard St / Ellett Rd & South Main St*	12.1	B	12.9	B	13.4	B	20.6	C
Site Entrance & Country Club Dr	--	--	--	--	--	--	10.3	B
Site Entrance & South Main St	--	--	--	--	--	--	17.4	C
Site Entrance & King St	--	--	--	--	--	--	10.1	B
King St & Hubbard St	--	--	--	--	--	--	12.8	B

*Analysis results shown based on analysis performed in Synchro.

Conclusions

Results show that the intersections analyzed as part of this study that currently operate at an acceptable LOS C or better will continue to do so through build-out, with the exception of the Landsdowne Street & South Main Street intersection, although the total delay increase is minimal at 7.1 seconds. The LOS of the King Street & South Main Street Intersection is currently at E and projected to fall to F prior to the development buildout. The analysis results do not account for possible traffic gaps created by the nearby traffic signals at Hubbard Road and Marlington Street, which may serve to reduce delays at the King Street intersection.

To adequately serve the proposed development, new traffic signals are recommended at the site entrances across from both Ardmore and Marlington Streets. Right-turn lanes into the site at those two new entrances are also recommended, with a continuous right-turn lane serving both the entrance across from Ardmore Street and the proposed right-in right-out entrance. A left-turn lane modification for traffic turning into the site at the Ardmore intersection is also recommended to create adequate left-turn storage northbound along South Main Street. No other turn lanes are recommended along South Main Street. For the new entrances along Country Club Drive and King Street, and the re-connected intersection of King Street and Hubbard Street, no additional improvements are recommended. Signal timing optimizations are recommended for all traffic signals along the South Main Street corridor.

Introduction

This report was prepared by Anderson & Associates, Inc. (A&A) for Fairmount Properties to evaluate potential traffic impacts that may result from the proposed commercial development located along South Main Street in the Town of Blacksburg, Virginia. This study was performed in accordance with the Land Development Guidelines (Virginia Department of Transportation, 1995) and the Highway Capacity Manual (Transportation Research Board, 2000 edition).

Site Description

The site to be developed (approximately 40 acres, total) is located in the Town of Blacksburg, Virginia. The property is surrounded by private property to the west, Country Club Drive to the north, South Main Street to the east, and King Street to the south, as shown in Figure 1. The projected buildout date for the development (Design Year) is 2008.

Currently the site houses several abandoned or inactive commercial properties, which currently generate very little traffic. This study is based on the proposed site plan provided by CMH Architects, dated March 20 2007, as shown in Figure 2. The site plan shows that the development will consist of a mix of multiple commercial retail and service types. Proposed access to the site will be via the following signalized and unsignalized intersections:

Intersection	Access Description
Country Club Dr & Airport Rd	Will be utilized by site traffic from the proposed development.
Country Club Dr & South Main St	Will be utilized by site traffic from the proposed development.
Kroger / CVS Entrances & South Main St	Will be utilized by site traffic from the proposed development.
Ardmore St & South Main St	Will provide access to the development from South Main St
Landsdowne St & South Main St	Will be utilized by site traffic from the proposed development.
Marlington St & South Main St	Will provide access to the development from South Main St
King St / Wendy's & South Main St	Will provide access to the development from South Main St
Hubbard St / Ellett Rd & South Main St	Will be utilized by site traffic from the proposed development.
Site Entrance & Country Club Rd	Will provide access to the development from Country Club Rd
Site Entrance & South Main St	Will provide access to the development from South Main St
Site Entrance & King St	Will provide access to the development from King St
King St & Hubbard St	Will be reconnected and provide access to the development from Hubbard St

Adjacent to the site, South Main St is a divided four-lane roadway (two lanes in each direction) with a posted speed limit of 35 mph. Country Club Dr, Airport Rd, Ardmore St, Landsdowne St, Marlinton St, King St, Hubbard St, and Ellett Rd are all two-lane roadways (one lane in each direction) with posted speed limits of 25 mph. See Figures 3-8 for existing lane configurations.

Traffic generators in the area include residential, commercial, restaurants, offices, and other various types of service-oriented businesses.

Analysis Methodology

Conclusions and recommendations for improvements are based on requirements outlined in the following resources:

- Acceptable traffic performance is LOS “C” for signalized intersections as well as each lane group as defined in the VDOT Land Development Guidelines (1995). The VDOT Land Development Guidelines do not define an acceptable traffic LOS for unsignalized intersections.
- Turn lane warrants are based on the VDOT Road Design Manual (2001).
- Traffic signal warrants, if required, are based on the Manual of Uniform Traffic Control Devices (MUTCD), 2003 Edition.
- Capacity analyses for unsignalized intersections were performed using Highway Capacity Software, Version 5.2 (HCS+). HCS+ is a product of the McTrans Center, University of Florida, and is based on principles of the Highway Capacity Manual (Transportation Research Board, 2000 edition).
- Signalized intersection analysis was performed using Synchro 6 Traffic Signal Coordination Software (Synchro). Synchro is a product of Trafficware Corporation of Albany, California.
- Report recommendations are based on Synchro analysis for signalized intersections and HCS+ analysis for unsignalized intersections.

Analysis of Pre-Development Conditions

The VDOT Land Development Guidelines require analysis of Existing Year and Design Year traffic conditions to determine the scope of improvements warranted by future traffic alone, without considering the impact of additional site traffic. Analysis of 2004 Existing Conditions, 2007 Projected Conditions, and 2008 No-Build Conditions are addressed in this section. Analysis results are summarized in Tables 2 through 4 and 6 through 9.

Development of Traffic Conditions without Development

Continuous tube counts were obtained on Country Club Drive, Hubbard Street, and South Main Street from November 15, 2004 through November 18, 2004. To our knowledge, the counts obtained are representative of typical traffic conditions in the area.

Manual turning movement counts were collected at the intersections of Kroger / CVS Entrance & South Main Street, Ardmore Street & South Main Street, Lansdowne Street & South Main Street, Marlinton Street & South Main Street, King Street / Wendy's & South Main Street, and Hubbard Street / Ellett Road & South Main Street on Monday November 15, 2004 from 7:00-9:00 AM and 4:00-6:00 PM. Counts at Airport Road & Country Club Drive and Country Club Drive & South Main Street were collected Wednesday November 17, 2004 from 7:00-9:00 AM and 4:00-6:00 PM. Midday counts at all the intersections were collected on Thursday December 2, 2004 from 11:00 AM-1:30 PM. To our knowledge, these counts are representative of a typical day of traffic conditions in the area and were taken while Virginia Tech was in session. A review of the manual turning movement counts revealed that the AM counts were significantly lower than the Midday and PM counts; therefore, the AM traffic was not analyzed. Existing 2004 Midday and PM Peak Hour Volumes for the intersections are shown in Figures 9 and 10.

VDOT Historical traffic data for South Main Street shows an AAWDT of 19,000 vehicles in 2001 and 20,000 vehicles in 2004, which is consistent with the counts obtained by A&A. This results in an annual growth rate of approximately 1.75% between 2001 and 2004. Annual growth rates in previous reports were estimated to be at 3%, but additional information from VDOT revealed that the actual growth rate was lower than previous estimates. Projected 2007 Midday and PM Peak Hour Volumes without traffic generated by the development are shown in Figures 11 and 12. Background 2008 Midday and PM Peak Hour Volumes without traffic generated by the proposed development are shown in Figures 13 and 14.

Roadway Capacity Analysis

Capacity analysis cannot be performed on the roadways included in this study since the posted speed limits are less than 45 mph, resulting in free flow speeds well below 45 mph. Free flow speeds below 45 mph are outside the Highway Capacity Manual's methodology for four-lane roadways; therefore, recommendations for this study are based on results of the intersection analyses.

Signalized Intersections without Development Traffic

The table below summarizes overall delay and LOS results based on Synchro analysis for signalized intersections, without development traffic:

Intersection	Peak Hour	2004 Existing Traffic		2007 Projected Traffic		2008 Background Traffic	
		Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
Country Club Dr & South Main St	Midday	9.0	A	10.4	B	10.3	B
	PM	12.5	B	13.1	B	13.3	B
Kroger/CVS & South Main St	Midday	10.1	B	11.0	B	11.0	B
	PM	9.9	A	11.6	B	11.5	B
Hubbard/Ellett & South Main St	Midday	10.8	B	11.1	B	10.7	B
	PM	12.1	B	12.9	B	13.4	B

Based on analysis results, it was determined that the intersections shown above operate at an overall LOS B or better during peak hours in the Existing Year (2004), Projected Year (2007), and will continue to do so through the Design Year (2008) without the additional site trips from the proposed development.

Turn lane storage needs were evaluated based on the Synchro analysis, and it was determined that additional turn lanes or storage lengths are not warranted at these intersections. Signal timing optimization is recommended at these intersections to minimize intersection delays.

Unsignalized Intersections without Development Traffic

The table below summarizes delay and LOS results based on HCS+ analysis for the approach with the highest delay for the following unsignalized intersections:

Intersection	Peak Hour	2004 Existing Traffic		2007 Projected Traffic		2008 Background Traffic	
		Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
Country Club Dr & Airport Rd*	Midday	12.0	B	12.7	B	13.1	B
	PM	12.0	B	12.7	B	13.1	B
Ardmore St & South Main St	Midday	15.0	B	15.6	C	16.3	C
	PM	19.4	C	21.3	C	21.8	C
Landsdowne St & South Main St	Midday	21.3	C	23.4	C	23.9	C
	PM	19.2	C	20.4	C	20.9	C
Marlington St & South Main St	Midday	18.3	C	19.8	C	20.2	C
	PM	24.6	C	27.5	D	29.4	D
King St/Wendy's & South Main St	Midday	39.2	E	47.0	E	51.1	F
	PM	40.9	E	47.9	E	52.2	F

*LOS and Delay shown are overall for this intersection

Based on analysis results, it was determined that the intersections operate at overall LOS C or better during peak hours in the Existing Year (2004), Projected Year (2007), and will continue to do so through the Design Year (2008) without the additional site trips from the proposed development. The intersection of Marlington Street & South Main Street drops to a LOS D in 2007 and analysis indicates a LOS D with less than five seconds of delay increase in 2008

without traffic from the proposed development. The intersection of King Street/Wendy's & South Main Street has a LOS E in 2004 and drops to a LOS F with less than twelve seconds of delay increase by 2008 without traffic from the proposed development. No physical improvements to this intersection are possible due to the configuration of the Wendy's entrance and close proximity to adjacent intersections.

Turn lane warrants were reviewed based on the VDOT Road Design Manual, and it was determined that a right-turn lane is warranted on northbound South Main Street at Marlington Street and the Wendy's entrance based on existing 2004 traffic volumes. It was also determined that northbound right-turn tapers on South Main Street at Ardmore Street and Landsdowne Street are warranted based on existing 2004 traffic volumes. No additional turn lanes or turn lane improvements are recommended. The right-turn lane into Wendy's is not feasible given the current site configuration however, although a right-turn taper is present.

Analysis of 2008 Buildout Conditions

Based on the VDOT Land Development Guidelines, analysis of buildout traffic conditions may be used to determine what specific improvements the additional site traffic warrants on the local roads above and beyond the improvements necessary to accommodate the projected background traffic. Analysis of Buildout Conditions is addressed in this section and the analysis results are summarized in Tables 5, 6, and 10.

Development of Site-Generated Traffic

Traffic volumes anticipated by the proposed commercial development were generated based on the Institute of Transportation Engineers Trip Generation Manual (Seventh Edition) and are shown in Table 1.

Trip Generation Assumptions:

1. ITE Land Use Type 445 (Multiplex Movie Theater) for the proposed movie theater complex.
2. ITE Land Use Type 813 (Free-Standing Discount Superstore) for the large retail building.
3. ITE Land Use Type 814 (Specialty Retail Center) for the proposed retail shops in the site.
4. ITE Land Use Type 881 (Pharmacy with Drive-Through) for the proposed pharmacy.
5. ITE Land Use Type 932 (High-Turnover Sit-Down Restaurant) for the proposed out-parcel restaurants.
6. ITE Land Use Type 934 (Fast Food Restaurant with Drive-Through) for the proposed out-parcel fast food restaurant.

These land uses in this study were chosen to represent the maximum build-out potential for the site based on the available land and possible configurations of the site. It is possible that the actual development will be smaller or different in scope, and therefore result in lower traffic volumes than what is depicted in this study, which would result in lower overall traffic impacts to the adjacent roadways.

Traffic Assignment to the Adjacent Roadways

For the purpose of site trip distribution, it was assumed that 48% of the traffic will access the site from the north via South Main Street, 35% will access the site from the south via South Main Street, 5% will access the site from the west and 2% will access the site from the east via Country Club Drive, 5% will access the site from the east via Ellett Road, 2% will access the site from the east via Ardmore Street, 2% will access the site from the east via Marlington Street, and 1% will access the site from the west via Hubbard Street. Traffic leaving the site was assumed to exit the site in the same percentage splits. The allocation of site trips to adjacent roadways as described above is shown graphically in Figures 15 and 16 for the Midday and PM periods, respectively. The trip generation split percentages are shown in Appendix F.

Overall Design Year (2008) Buildout Traffic, as shown in Figures 17 and 18, was calculated by summing the Design Year (2008) Background traffic volumes for the peak hours with the site-generated traffic. Design Year (2008) Buildout Traffic volumes were then analyzed to determine if roadway improvements are necessary due to the proposed development. To account for the potential change in traffic patterns when King Street is reconnected to Hubbard Street, it was assumed that a majority of traffic presently making left turns from King Street onto South Main Street would adjust their trips to utilize the traffic signal at Hubbard Street to reduce their overall travel delays.

Signalized Intersections with Development Traffic

The table below summarizes overall delay and LOS results based on Synchro analysis for signalized intersections:

Intersection	Peak Hour	2008 Background Traffic		2008 Buildout Traffic	
		Delay (s)	LOS	Delay (s)	LOS
Country Club Dr & South Main St	Midday	10.3	B	13.0	B
	PM	13.3	B	20.6	C
Kroger/CVS & South Main St	Midday	11.0	B	11.4	B
	PM	11.5	B	12.0	B
Hubbard/Ellett & South Main St	Midday	10.7	B	13.0	B
	PM	13.4	B	20.5	C
Ardmore St & South Main St	Midday	--	--	10.4	B
	PM	--	--	14.3	B
Marlington St & South Main St	Midday	--	--	10.7	B
	PM	--	--	12.4	B

Based on analysis results, it was determined that the intersections shown above operate at LOS C or better in the Design Year (2008) with the additional site trips from the proposed development. Traffic signals are recommended at the intersections of Ardmore and Marlington Streets with South Main Street as a part of the development to improve traffic flow for site traffic and along the South Main Street corridor. Signal warrants analysis for the Ardmore and Marlington intersections are shown in Appendix E along with HCS+ analysis for those intersections as stop-controlled in the 2008 buildout period for comparison, which would have LOS F with significant delays.

Turn lane needs were evaluated based on the Synchro analysis, and right turn lanes into the site at Ardmore Street and Marlington Street are recommended. An extension of the left-turn storage bay at Ardmore Street for traffic entering the site is also recommended.

Unsignalized Intersections with Development Traffic

The table below summarizes delay and LOS results based on HCS+ analysis for the approach with the highest delay for the following unsignalized intersections:

Intersection	Peak Hour	2008 Background Traffic		2008 Buildout Traffic	
		Delay (s)	LOS	Delay (s)	LOS
Country Club Dr & Airport Rd*	Midday	13.1	B	14.0	B
	PM	13.1	B	14.5	B
Ardmore St & South Main St**	Midday	16.3	C	550.6	F
	PM	21.8	C	##	F
Landsdowne St & South Main St	Midday	23.9	C	28.4	D
	PM	20.9	C	22.3	C
Marlington St & South Main St**	Midday	20.2	C	208.5	F
	PM	29.4	D	1400.0	F
King St/Wendy's & South Main St	Midday	51.1	F	61.0	F
	PM	52.2	F	67.3	F
Site Entrance & Country Club Dr	Midday	--	--	10.2	B
	PM	--	--	10.3	B
Site Entrance & South Main St	Midday	--	--	14.2	B
	PM	--	--	17.4	C
Site Entrance & King St	Midday	--	--	9.7	A
	PM	--	--	10.1	B
King St & Hubbard St	Midday	--	--	11.4	B
	PM	--	--	12.8	B

*LOS and Delay shown are overall for this intersection

**These intersections recommended for signalization for 2008 buildout

##LOS not able to be calculated, beyond range of Highway Capacity Manual

Based on analysis results, it was determined that the intersections operate at LOS C or better in the Design Year (2008) with the additional site trips from the proposed development. The intersections of Ardmore Street and Marlington Street with South Main Street are both recommended for traffic signals at 2008 buildout. The intersection of King Street/Wendy's & South Main Street has a LOS F in 2008 and stays at LOS F with about fifteen seconds of delay increase with traffic from the proposed development. No physical improvements to this intersection are possible due to the configuration of the Wendy's entrance and close proximity to adjacent intersections.

Turn lane warrants were reviewed based on the VDOT Road Design Manual, and a right-turn lane into the site at the right-in entrance from South Main Street is recommended. Because of its proximity to the recommended turn lane into the site at Ardmore Street, it is recommended that a continuous right-turn lane be utilized to handle right-turn traffic for both entrances. A right-turn taper at the re-connected intersection of King Street & Hubbard Street is warranted based on traffic volumes, although one is not recommended due to the low travel speed along Hubbard Street. A SB right-turn taper on South Main Street at King Street is warranted based on volume requirements, although it is not recommended due to right-of-way restrictions and proximity to large existing drainage structures. No additional turn lanes or storage lengths are recommended at these intersections for the buildout conditions.

Roadway Capacity Analysis

As previously discussed in Analysis of Pre-Development Conditions, analysis could not be performed on the roadways.

Conclusions and Recommendations

Existing Year 2004:

Country Club Drive & Airport Road

Based on this study, no improvements are recommended.

Country Club Road & South Main Street

Based on this study, signal timing optimization is recommended.

Kroger/CVS Entrances & South Main Street

Based on this study, signal timing optimization is recommended.

Ardmore Street & South Main Street

Based on this study, a NB right-turn taper is recommended.

Landsdowne Street & South Main Street

Based on this study, a NB right-turn taper is recommended.

Marlington Street & South Main Street

Based on this study, a NB right-turn lane is warranted.

King Street/Wendy's & South Main Street

Based on this study, no improvements are recommended as explained in the report.

Hubbard Street/Ellett Road & South Main Street

Based on this study, signal timing optimization is recommended.

Projected Year 2007 Traffic (Excluding Site Generated Traffic):

Country Club Drive & Airport Road

Based on this study, no improvements are recommended.

Country Club Road & South Main Street

Based on this study, signal timing optimization is recommended.

Kroger/CVS Entrances & South Main Street

Based on this study, signal timing optimization is recommended.

Ardmore Street & South Main Street

Based on this study, no additional improvements are recommended.

Landsdowne Street & South Main Street

Based on this study, no additional improvements are recommended.

Marlington Street & South Main Street

Based on this study, no additional improvements are recommended.

King Street/Wendy's & South Main Street

Based on this study, no improvements are recommended as explained in the report.

Hubbard Street/Ellett Road & South Main Street

Based on this study, signal timing optimization is recommended.

Design Year 2008 Background Traffic (Excluding Site Generated Traffic):***Country Club Drive & Airport Road***

Based on this study, no improvements are recommended.

Country Club Road & South Main Street

Based on this study, signal timing optimization is recommended.

Kroger/CVS Entrances & South Main Street

Based on this study, signal timing optimization is recommended.

Ardmore Street & South Main Street

Based on this study, no additional improvements are recommended.

Landsdowne Street & South Main Street

Based on this study, no additional improvements are recommended.

Marlington Street & South Main Street

Based on this study, no additional improvements are recommended.

King Street/Wendy's & South Main Street

Based on this study, no improvements are recommended as explained in the report.

Hubbard Street/Ellett Road & South Main Street

Based on this study, signal timing optimization is recommended.

Design Year 2008 Buildout Traffic (Including Site Generated Traffic):***Country Club Drive & Airport Road***

Based on this study, no improvements are recommended.

Country Club Road & South Main Street

Based on this study, signal timing optimization is recommended.

Kroger/CVS Entrances & South Main Street

Based on this study, signal timing optimization is recommended.

Ardmore Street & South Main Street

Based on this study, a traffic signal with a left- and through/right-turn lane onto South Main Street is recommended to accommodate the proposed site entrance. A SB right-turn lane into the site and an extension of the NB left-turn lane into the site are also recommended.

Landsdowne Street & South Main Street

Based on this study, no additional improvements are recommended.

Marlington Street & South Main Street

Based on this study, a traffic signal with a left- and through/right-turn lane onto South Main Street is recommended to accommodate the proposed site entrance. A SB right-turn lane into the site is also recommended.

King Street/Wendy's & South Main Street

Based on this study, no improvements are recommended as explained in the report.

Hubbard Street/Ellett Road & South Main Street

Based on this study, signal timing optimization is recommended.

Site Entrance & Country Club Drive

Based on this study, a standard commercial entrance prohibiting left-turns out of the site onto Country Club Drive is recommended.

Site Entrance & South Main Street

Based on this study, a standard commercial entrance and a SB right-turn lane is recommended, and should be a continuous right-turn lane adjoining the recommended right-turn lane at Ardmore Street.

Site Entrance & King Street

Based on this study, a standard commercial entrance is recommended.

King Street & Hubbard Street

Based on this study, a standard T-intersection is recommended.

Based on analysis results, the LOS for all signalized intersections are within VDOT acceptable guidelines. The LOS for the Lansdowne Street and King Street/Wendy's intersections with South Main Street are below LOS C, although VDOT does not list acceptable guidelines for unsignalized intersections. Delays at these intersections may be reduced by traffic gaps created by adjacent traffic signals, although this cannot be estimated in the analysis. Physical roadway improvements to reduce delays, such as adding turn lanes or signalization are not feasible in either location due to their proximity to existing and proposed traffic signals and due to right-of-way impacts if additional turn lanes were constructed.

Please see Figures 19 through 25 for proposed lane configurations. Actual dimensions of recommended turn lanes will be determined based on available right-of-way and VDOT requirements, and will be included with roadway plans that are scheduled to be submitted at a later date. It is recommended that BT bus stops located on South Main Street along the frontage of the development be relocated to minimize conflicts with the proposed entrances. It is also recommended that a BT stop be located adjacent to the proposed pedestrian bridge into the site for safer and more efficient pedestrian movement from the bus stop to the proposed development.

Tables

- Table 1 Trip Generation for Proposed Development
- Table 2 LOS Summary for Signalized Intersections, 2004 Existing
- Table 3 LOS Summary for Signalized Intersections, 2007 Projected
- Table 4 LOS Summary for Signalized Intersections, 2008 Background
- Table 5 LOS Summary for Signalized Intersections, 2008 Buildout
- Table 6 LOS Summary for All-way Stop-Controlled Intersections
- Table 7 LOS Summary for Unsignalized Intersections, 2004 Projected
- Table 8 LOS Summary for Unsignalized Intersections, 2007 Projected
- Table 9 LOS Summary for Unsignalized Intersections, 2008 Background
- Table 10 LOS Summary for Unsignalized Intersections, 2008 Buildout

Table 1 - Trip Generation for Proposed Development

ITE Land Use Type	Independent Variable	Quantity	Weekday 24-Hour Total Daily Traffic	Directional Distribution		Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 11AM - 1 PM	Average Vehicle Trip Ends		Directional Distribution	
				Entering	Exiting		Entering	Exiting	Entering	Exiting
Multiplex Movie Theater (445)	per 1000 Sq. Ft	72.8	*No Trip Generation Data Available	**	**	*No Trip Generation Data Available	**	**	380	243
Free-Standing Discount Superstore (813)	per 1000 Sq. Ft	176.0	8660	4330	4330	720	374	345	687	337
Specialty Retail Center (814)	per 1000 Sq. Ft	147.8	6550	3275	3275	376	166	211	376	166
Pharmacy/Drugstore with Drive-Through (881)	per 1000 Sq. Ft	12.9	1138	569	569	102	50	52	111	54
High-Turnover (Sit-Down) Restaurant (932)	per 1000 Sq. Ft	14.4	1830	915	915	157	96	61	157	96
Fast Food Restaurant with Drive-Through (934)	per 1000 Sq. Ft	1.6	794	397	397	75	39	36	55	29
Total ITE Peak Hour Forecasted Trips Generated		18973	9486	9486	1429	724	705	1767	925	842

First & Main, Blacksburg
Town of Blacksburg, Virginia

Table 2: Signalized Intersection Analysis - 2004 Existing Volumes

Analysis Period	Intersection	Peak Hour	Approach	SYNCHRO		LOS	Delay (s/veh)
				Delay (s/veh)	LOS		
2004 - Existing Traffic	Country Club Drive & South Main Street	MID	EB	17.4	B		
			WB	17.3	B		
			NB	5.5	A		
			SB	8.8	A		
			OVERALL	9.0	A		
2004 - Existing Traffic	Kroger/CVS Entrances & South Main Street	MID	EB	15.7	B		
			WB	17.0	B		
			NB	8.9	A		
			SB	7.6	A		
			OVERALL	10.1	B		
2004 - Existing Traffic	Ellett Road / Hubbard Street & South Main Street	MID	EB	21.9	C		
			WB	24.4	C		
			NB	9.4	A		
			SB	7.3	A		
			OVERALL	10.8	B		
2004 - Existing Traffic	Country Club Drive & South Main Street	PM	EB	20.1	C		
			WB	13.9	B		
			NB	10.4	B		
			SB	10.9	B		
			OVERALL	12.5	B		
2004 - Existing Traffic	Kroger/CVS Entrances & South Main Street	PM	EB	17.4	B		
			WB	18.1	B		
			NB	8.1	A		
			SB	8.4	A		
			OVERALL	9.9	A		
2004 - Existing Traffic	Ellett Road / Hubbard Street & South Main Street	PM	EB	20.7	C		
			WB	29.0	C		
			NB	10.5	B		
			SB	7.8	A		
			OVERALL	12.1	B		

LOS	Delay (s/veh)
A	0-10
B	>10-20
C	>20-35
D	>35-55
E	>55-80
F	>80

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Table 3: Signalized Intersection Analysis - 2007 Projected Volumes

Analysis Period	Intersection	Peak Hour	Approach	SYNCHRO		LOS	Delay (s/veh)
				Delay (s/veh)	LOS		
2007 - Projected Traffic	Country Club Drive & South Main Street	MID	EB	18.7	B		
			WB	17.2	B		
			NB	6.5	A		
			SB	10.3	B		
			OVERALL	10.4	B		
2007 - Projected Traffic	Kroger/CVS Entrances & South Main Street	MID	EB	16.8	B		
			WB	18.7	B		
			NB	9.7	A		
			SB	8.1	A		
			OVERALL	11.0	B		
2007 - Projected Traffic	Ellett Road / Hubbard Street & South Main Street	MID	EB	22.1	C		
			WB	25.0	C		
			NB	9.8	A		
			SB	7.5	A		
			OVERALL	11.1	B		
2007 - Projected Traffic	Country Club Drive & South Main Street	PM	EB	20.8	C		
			WB	13.8	B		
			NB	11.0	B		
			SB	11.6	B		
			OVERALL	13.1	B		
2007 - Projected Traffic	Kroger/CVS Entrances & South Main Street	PM	EB	21.5	C		
			WB	22.7	C		
			NB	9.3	A		
			SB	9.5	A		
			OVERALL	11.6	B		
2007 - Projected Traffic	Ellett Road / Hubbard Street & South Main Street	PM	EB	20.5	C		
			WB	31.9	C		
			NB	10.5	B		
			SB	8.9	A		
			OVERALL	12.9	B		

LOS	Delay (s/veh)
A	0-10
B	>10-20
C	>20-35
D	>35-55
E	>55-80
F	>80

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Table 4: Signalized Intersection Analysis - 2008 Background Volumes

Analysis Period	Intersection	Peak Hour	Approach	SYNCHRO		LOS	Delay (s/veh)
				Delay (s/veh)	LOS		
2008 - Background Traffic	Country Club Drive & South Main Street	MID	EB	21.2	C		
			WB	19.1	B		
			NB	5.7	A		
			SB	9.4	A		
			OVERALL	10.3	B		
2008 - Background Traffic	Kroger/CVS Entrances & South Main Street	MID	EB	16.7	B		
			WB	18.6	B		
			NB	9.8	A		
			SB	8.2	A		
			OVERALL	11.0	B		
2008 - Background Traffic	Ellett Road / Hubbard Street & South Main Street	MID	EB	20.6	C		
			WB	25.1	C		
			NB	9.5	A		
			SB	7.0	A		
			OVERALL	10.7	B		
2008 - Background Traffic	Country Club Drive & South Main Street	PM	EB	20.9	C		
			WB	13.7	B		
			NB	11.3	B		
			SB	11.8	B		
			OVERALL	13.3	B		
2008 - Background Traffic	Kroger/CVS Entrances & South Main Street	PM	EB	21.1	C		
			WB	22.4	C		
			NB	9.3	A		
			SB	9.5	A		
			OVERALL	11.5	B		
2008 - Background Traffic	Ellett Road / Hubbard Street & South Main Street	PM	EB	20.8	C		
			WB	34.0	C		
			NB	10.7	B		
			SB	9.4	A		
			OVERALL	13.4	B		

LOS	Delay (s/veh)
A	0-10
B	>10-20
C	>20-35
D	>35-55
E	>55-80
F	>80

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Table 6: All-Way Stop Controlled Intersection Analysis

Analysis Period	Intersection	Peak Hour	Approach	HCS+		LOS	Delay (s/veh)
				Delay (s/veh)	LOS		
2004 - Existing Traffic	Country Club Drive & Airport Road	MID	EB	9.1	A		
			WB	10.3	B		
			NB	9.7	A		
			SB	14.1	B		
			OVERALL	12.0	B		
2004 - Existing Traffic	Country Club Drive & Airport Road	PM	EB	9.1	A		
			WB	10.3	B		
			NB	9.7	A		
			SB	14.1	B		
			OVERALL	12.0	B		
2007 - Projected Traffic	Country Club Drive & Airport Road	MID	EB	9.3	A		
			WB	10.8	B		
			NB	10.0	A		
			SB	15.2	C		
			OVERALL	12.7	B		
2007 - Projected Traffic	Country Club Drive & Airport Road	PM	EB	9.3	A		
			WB	10.8	B		
			NB	10.0	A		
			SB	15.2	C		
			OVERALL	12.7	B		
2008 - Background Traffic	Country Club Drive & Airport Road	MID	EB	9.4	A		
			WB	11.0	B		
			NB	10.1	B		
			SB	15.8	C		
			OVERALL	13.1	B		
2008 - Background Traffic	Country Club Drive & Airport Road	PM	EB	9.4	A		
			WB	11.0	B		
			NB	10.1	B		
			SB	15.8	C		
			OVERALL	13.1	B		
2008 - Buildout Traffic	Country Club Drive & Airport Road	MID	EB	9.6	A		
			WB	12.0	B		
			NB	10.5	B		
			SB	17.3	C		
			OVERALL	14.0	B		
2008 - Buildout Traffic	Country Club Drive & Airport Road	PM	EB	9.7	A		
			WB	12.3	B		
			NB	10.6	B		
			SB	18.1	C		
			OVERALL	14.5	B		

LOS	Delay (s/veh)
A	0-10
B	>10-15
C	>15-25
D	>25-35
E	>35-50
F	>50

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Table 7: Two-Way Stop Controlled Intersection Analysis

Analysis Period	Intersection	Peak Hour	Approach	HCS+	
				Delay (s/veh)	LOS
2004 - Existing Traffic	Ardmore Street & South Main Street	MID	EB	*	*
			WB	15.0	B
			NB	*	*
			SB	*	*
2004 - Existing Traffic	Landsdowne Street & South Main Street	MID	EB	15.5	C
			WB	21.3	C
			NB	*	*
			SB	*	*
2004 - Existing Traffic	Marlington Street & South Main Street	MID	EB	*	*
			WB	18.3	C
			NB	*	*
			SB	*	*
2004 - Existing Traffic	King Street / Wendy's & South Main Street	MID	EB	39.2	E
			WB	27.1	D
			NB	*	*
			SB	*	*
2004 - Existing Traffic	Ardmore Street & South Main Street	PM	EB	*	*
			WB	19.4	C
			NB	*	*
			SB	*	*
2004 - Existing Traffic	Landsdowne Street & South Main Street	PM	EB	19.2	C
			WB	16.4	C
			NB	*	*
			SB	*	*
2004 - Existing Traffic	Marlington Street & South Main Street	PM	EB	*	*
			WB	24.6	C
			NB	*	*
			SB	*	*
2004 - Existing Traffic	King Street / Wendy's & South Main Street	PM	EB	40.9	E
			WB	25.7	D
			NB	*	*
			SB	*	*

LOS	Delay (s/veh)
A	0-10
B	>10-15
C	>15-25
D	>25-35
E	>35-50
F	>50

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Table 8: Two-Way Stop Controlled Intersection Analysis

Analysis Period	Intersection	Peak Hour	Approach	HCS+	
				Delay (s/veh)	LOS
2007 - Projected Traffic	Ardmore Street & South Main Street	MID	EB	*	*
			WB	15.6	C
			NB	*	*
			SB	*	*
2007 - Projected Traffic	Landsdowne Street & South Main Street	MID	EB	16.2	C
			WB	23.4	C
			NB	*	*
			SB	*	*
2007 - Projected Traffic	Marlington Street & South Main Street	MID	EB	*	*
			WB	19.8	C
			NB	*	*
			SB	*	*
2007 - Projected Traffic	King Street / Wendy's & South Main Street	MID	EB	47.0	E
			WB	30.7	D
			NB	*	*
			SB	*	*
2007 - Projected Traffic	Ardmore Street & South Main Street	PM	EB	*	*
			WB	21.3	C
			NB	*	*
			SB	*	*
2007 - Projected Traffic	Landsdowne Street & South Main Street	PM	EB	20.4	C
			WB	17.3	C
			NB	*	*
			SB	*	*
2007 - Projected Traffic	Marlington Street & South Main Street	PM	EB	*	*
			WB	27.5	D
			NB	*	*
			SB	*	*
2007 - Projected Traffic	King Street / Wendy's & South Main Street	PM	EB	47.9	E
			WB	29.6	D
			NB	*	*
			SB	*	*

LOS	Delay (s/veh)
A	0-10
B	>10-15
C	>15-25
D	>25-35
E	>35-50
F	>50

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Table 9: Two-Way Stop Controlled Intersection Analysis

Analysis Period	Intersection	Peak Hour	Approach	HCS+	
				Delay (s/veh)	LOS
2008 - Background Traffic	Ardmore Street & South Main Street	MID	EB	*	*
			WB	16.3	C
			NB	*	*
			SB	*	*
2008 - Background Traffic	Landsdowne Street & South Main Street	MID	EB	16.4	C
			WB	23.9	C
			NB	*	*
			SB	*	*
2008 - Background Traffic	Marlington Street & South Main Street	MID	EB	*	*
			WB	20.2	C
			NB	*	*
			SB	*	*
2008 - Background Traffic	King Street / Wendy's & South Main Street	MID	EB	51.1	F
			WB	31.9	D
			NB	*	*
			SB	*	*
2008 - Background Traffic	Ardmore Street & South Main Street	PM	EB	*	*
			WB	21.8	C
			NB	*	*
			SB	*	*
2008 - Background Traffic	Landsdowne Street & South Main Street	PM	EB	20.9	C
			WB	17.6	C
			NB	*	*
			SB	*	*
2008 - Background Traffic	Marlington Street & South Main Street	PM	EB	*	*
			WB	29.4	D
			NB	*	*
			SB	*	*
2008 - Background Traffic	King Street / Wendy's & South Main Street	PM	EB	52.2	F
			WB	30.3	D
			NB	*	*
			SB	*	*

LOS	Delay (s/veh)
A	0-10
B	>10-15
C	>15-25
D	>25-35
E	>35-50
F	>50

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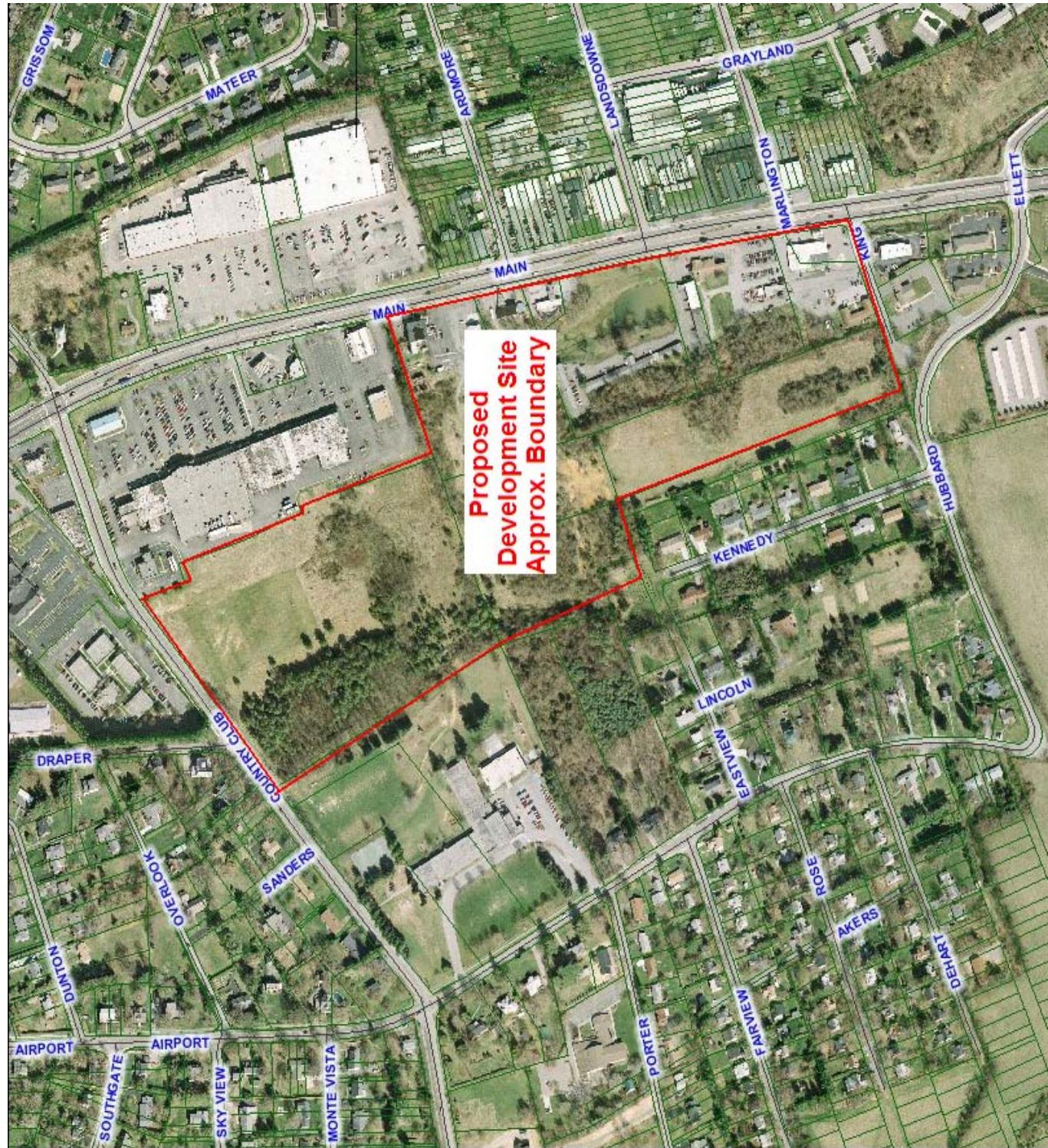
Table 10: Two-Way Stop Controlled Intersection Analysis

Analysis Period	Intersection	Peak Hour	Approach	HCS+	
				Delay (s/veh)	LOS
2008 - Background Traffic	Ardmore Street & South Main Street	MID	EB	550.6	F
			WB	90.7	F
			NB	*	*
			SB	*	*
2008 - Buildout Traffic	Landsdowne Street & South Main Street	MID	EB	*	*
			WB	28.4	D
			NB	*	*
			SB	*	*
2008 - Background Traffic	Marlington Street & South Main Street	MID	EB	208.5	F
			WB	73.1	F
			NB	*	*
			SB	*	*
2008 - Buildout Traffic	King Street / Wendy's & South Main Street	MID	EB	34.3	D
			WB	61.0	F
			NB	*	*
			SB	*	*
2008 - Buildout Traffic	Country Club Drive & Back Site Entrance	MID	EB	*	*
			WB	*	*
			NB	10.2	B
			SB	*	*
2008 - Buildout Traffic	Right-In Entrance & South Main Street	MID	EB	14.2	B
			WB	*	*
			NB	*	*
			SB	*	*
2008 - Buildout Traffic	Site Entrance & King Street	MID	EB	*	*
			WB	*	*
			NB	*	*
			SB	9.7	A
2008 - Buildout Traffic	King Street & Hubbard Street	MID	EB	*	*
			WB	11.4	B
			NB	*	*
			SB	*	*
2008 - Background Traffic	Ardmore Street & South Main Street	PM	EB	##	F
			WB	##	F
			NB	*	*
			SB	*	*
2008 - Buildout Traffic	Landsdowne Street & South Main Street	PM	EB	*	*
			WB	22.3	C
			NB	*	*
			SB	*	*
2008 - Background Traffic	Marlington Street & South Main Street	PM	EB	1400.0	F
			WB	1063.0	F
			NB	*	*
			SB	*	*
2008 - Buildout Traffic	King Street / Wendy's & South Main Street	PM	EB	43.2	E
			WB	67.3	F
			NB	*	*
			SB	*	*
2008 - Buildout Traffic	Country Club Drive & Back Site Entrance	PM	EB	*	*
			WB	*	*
			NB	10.3	B
			SB	*	*
2008 - Buildout Traffic	Right-In Entrance & South Main Street	PM	EB	17.4	C
			WB	*	*
			NB	*	*
			SB	*	*
2008 - Buildout Traffic	Site Entrance & King Street	PM	EB	*	*
			WB	*	*
			NB	*	*
			SB	10.1	B
2008 - Buildout Traffic	King Street & Hubbard Street	PM	EB	*	*
			WB	12.8	B
			NB	*	*
			SB	*	*

LOS	Delay (s/veh)
A	0-10
B	>10-15
C	>15-25
D	>25-35
E	>35-50
F	>50

Figures

- | | |
|------------------|--|
| Figure 1 | Site Location Map |
| Figure 2 | Proposed Site Plan |
| Figure 3 to 8 | Existing Lane Configurations |
| Figures 9 to 14 | Intersection Turning Movement Volumes (Existing Year 2004, Projected Year 2007, and Background Year 2008 without site trips) |
| Figures 15 to 16 | Site Traffic Distribution |
| Figures 17 to 18 | Intersection Turning Movement Volumes (Design Year 2008 with site trips) |
| Figures 19 to 25 | Proposed Lane Configurations |



*Image from Blacksburg WebGIS site



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Figure 1: Site Location Map



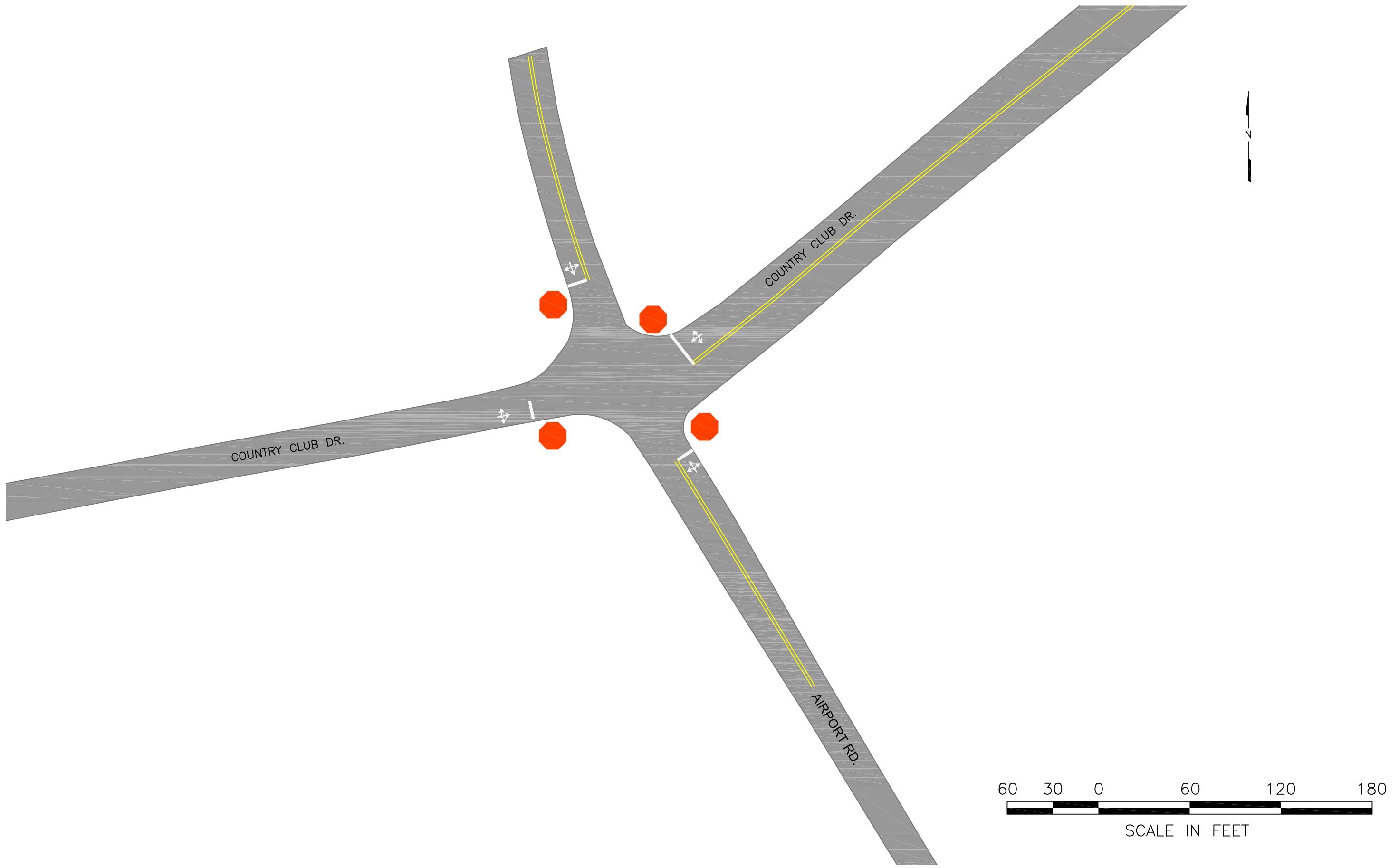
*Concept plan for development used for Trip Generation purposes

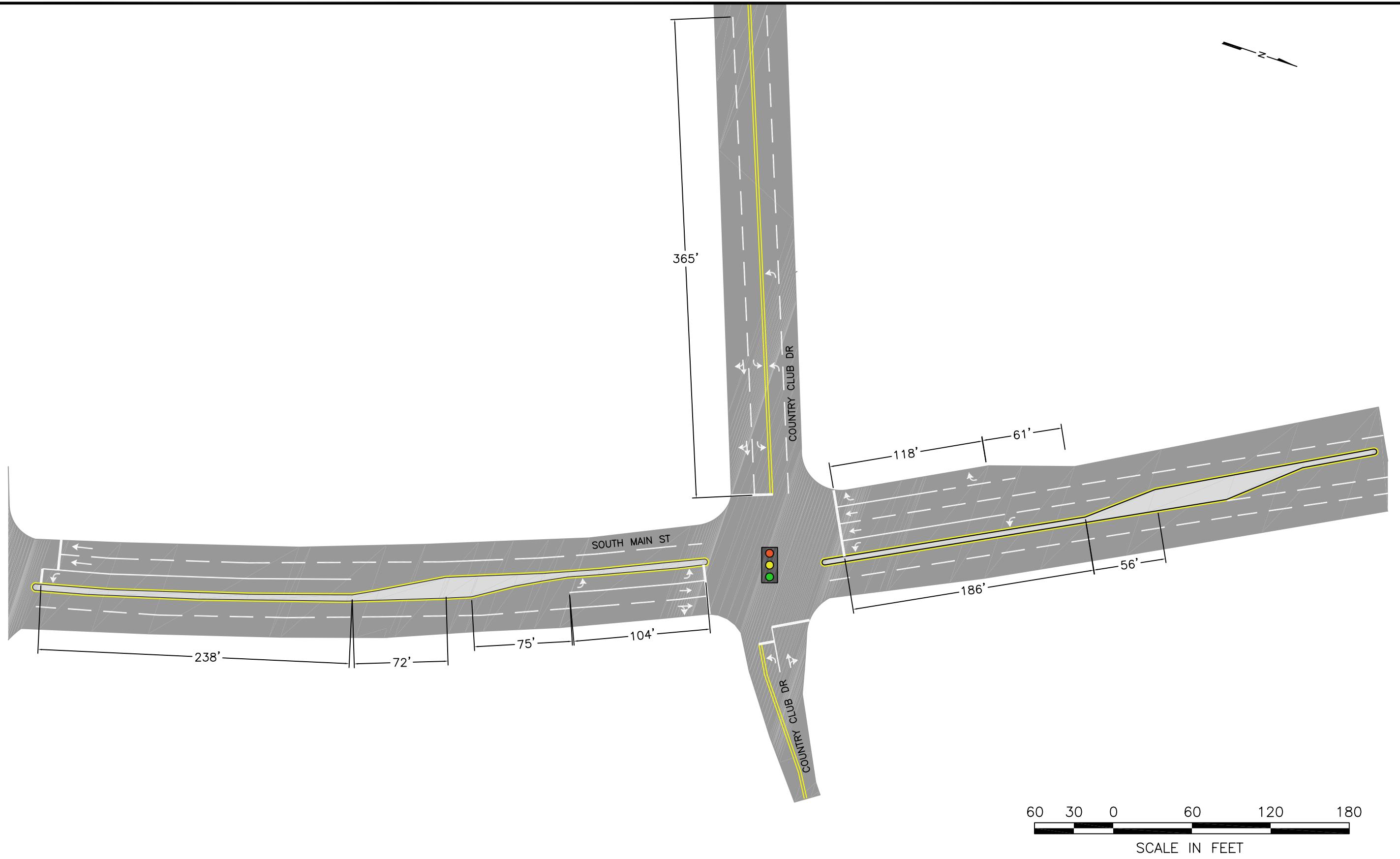


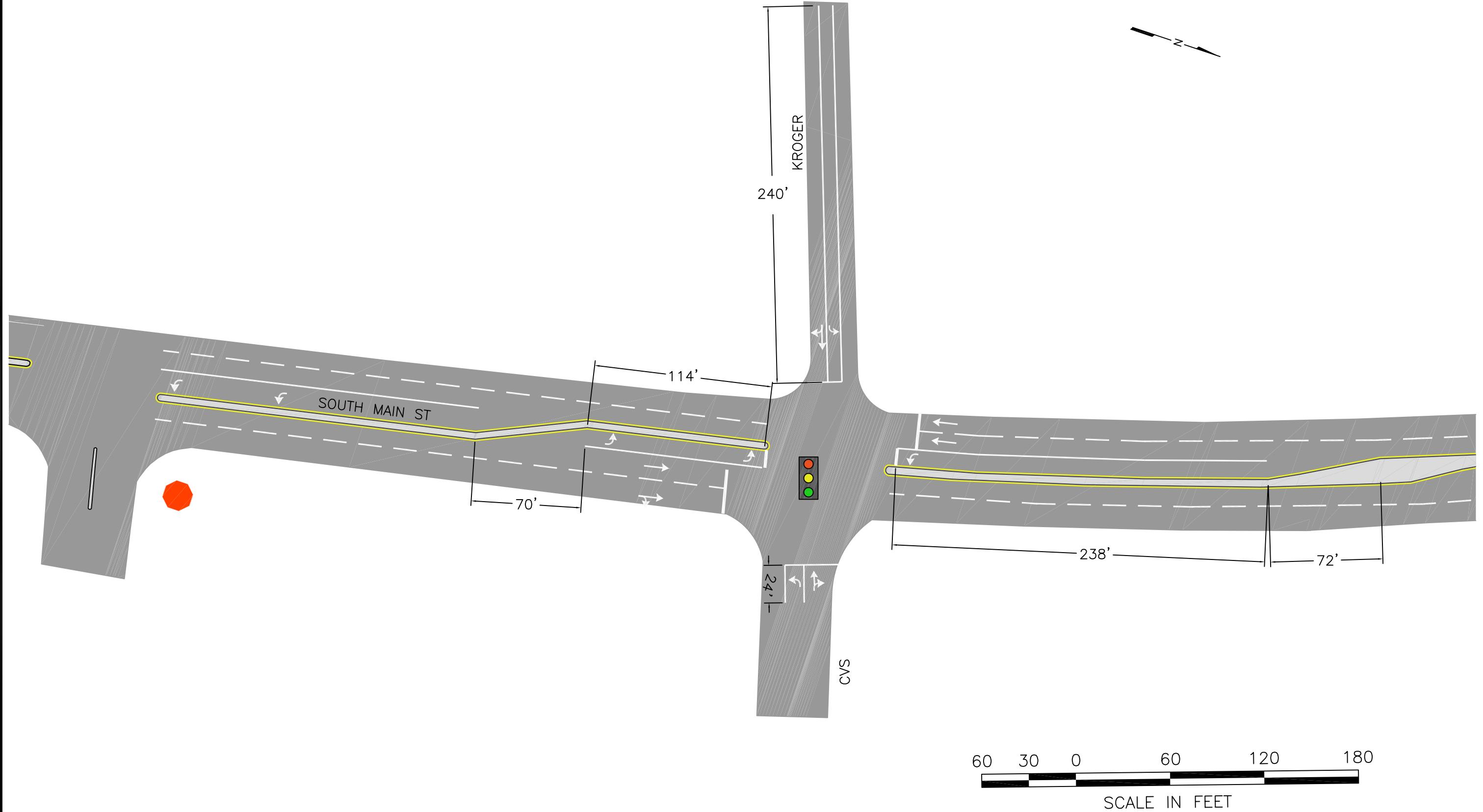
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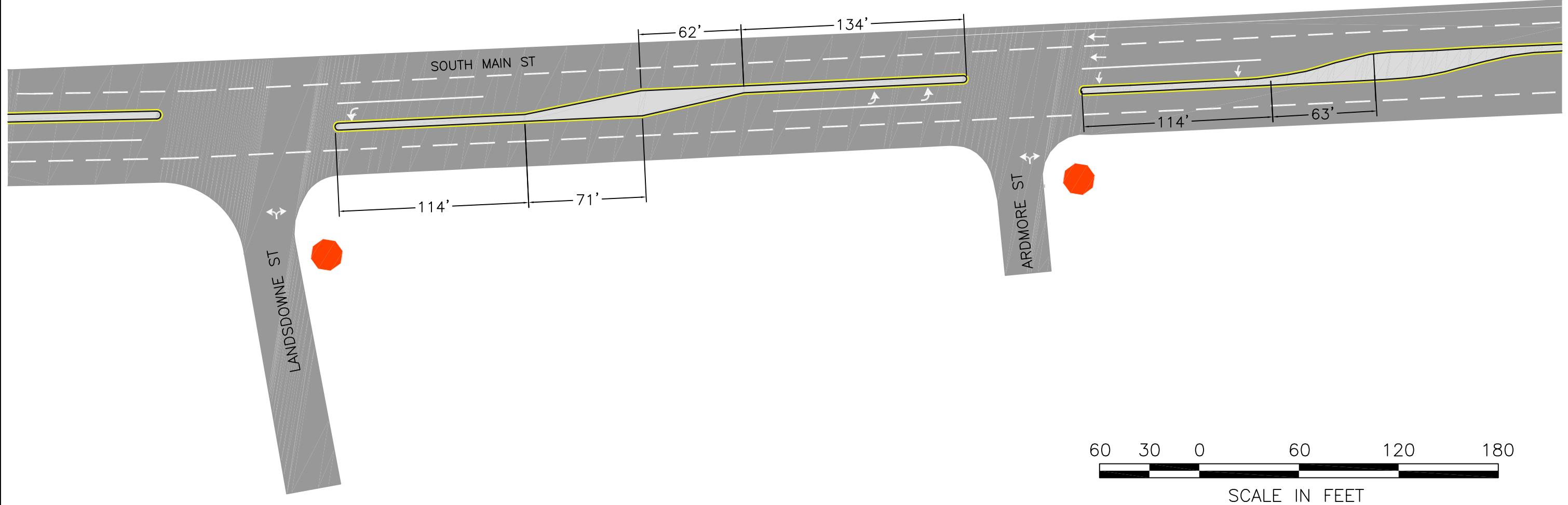
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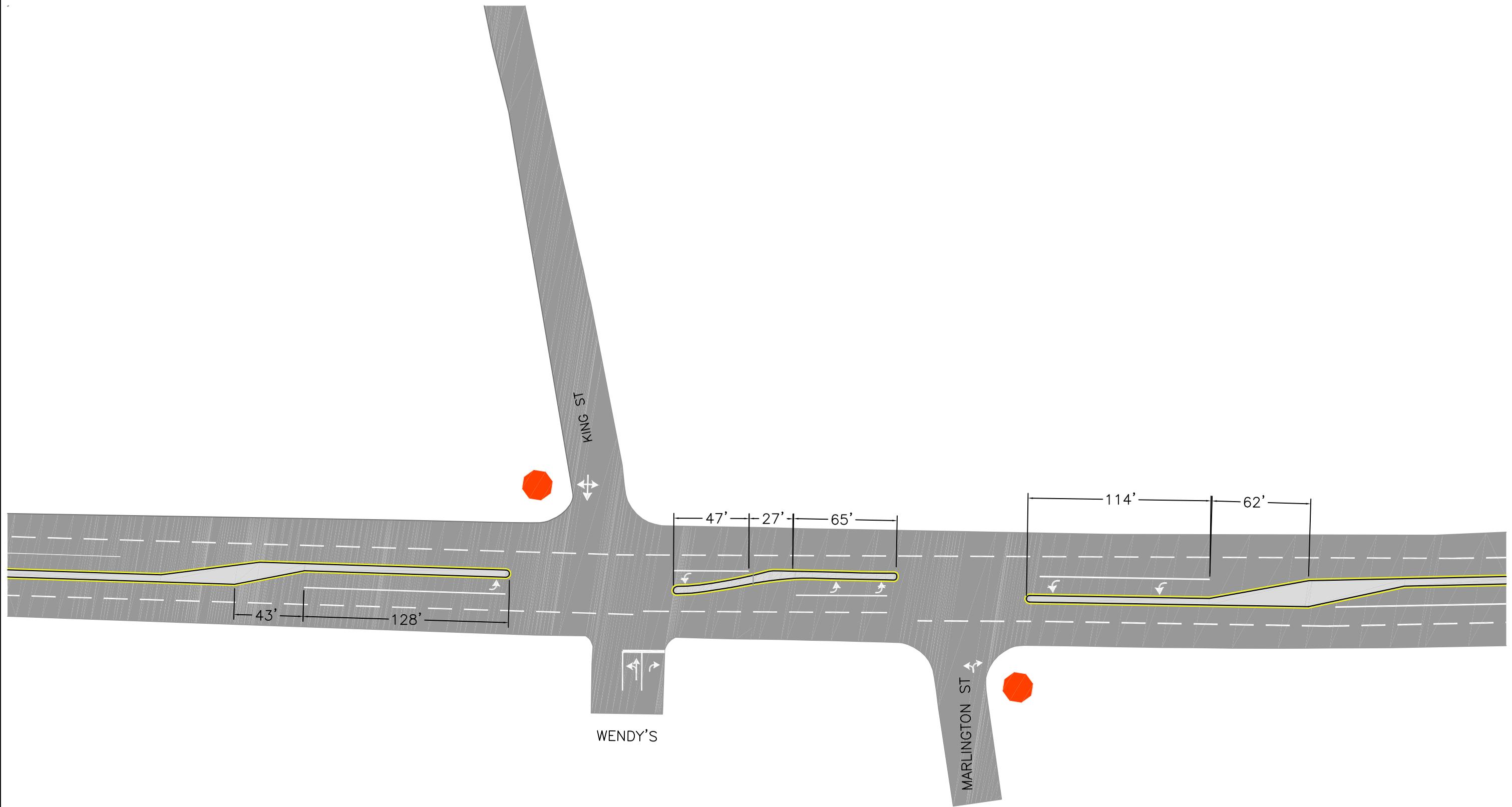
Figure 2: Proposed Site Plan

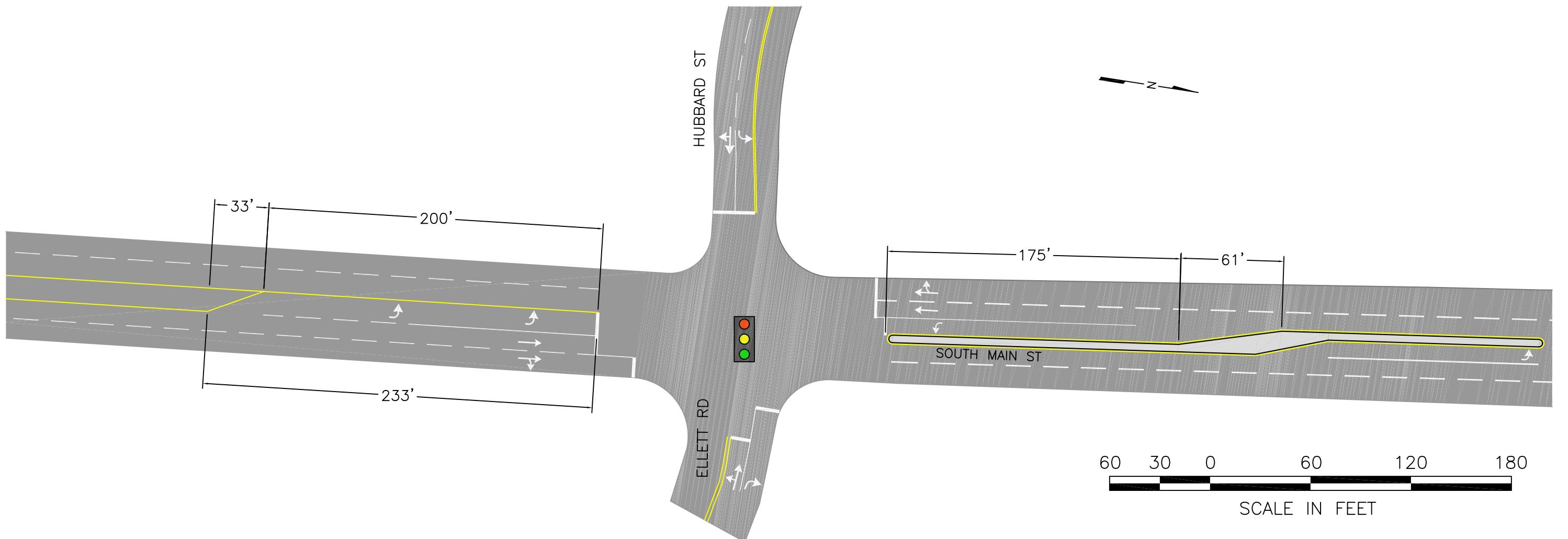


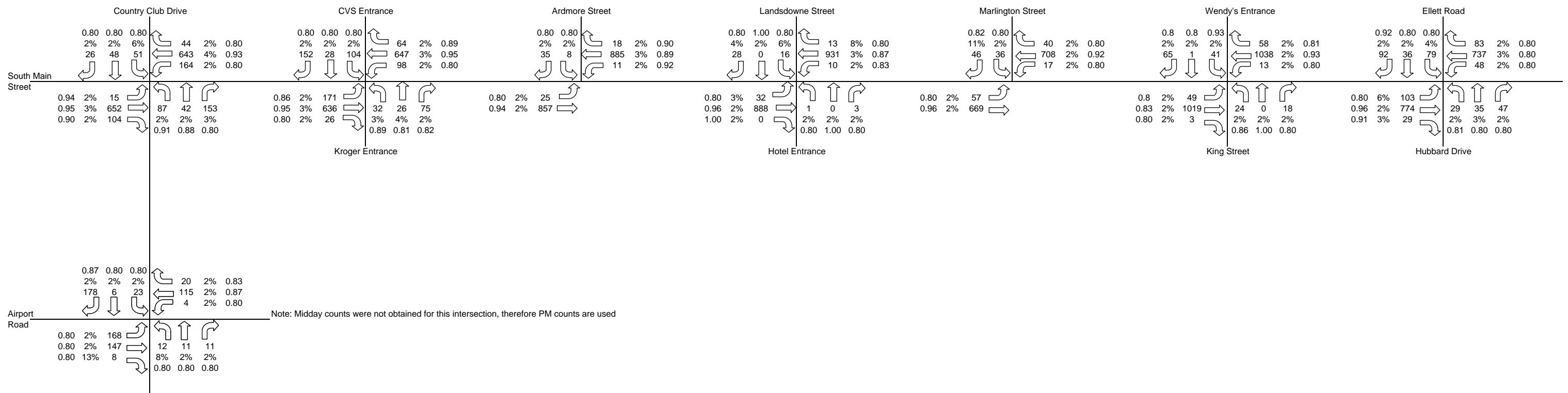












Legend

XX - Peak Hour Volume
 XX% - Percent Heavy Vehicles (Minimum 2% Used in Analysis)
 X.XX - Peak Hour Factor (Minimum 0.80 PHF Used in Analysis)

* Due to rounding, slight discrepancies in
 volumes balancing may exist.



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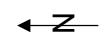


Figure 9: Midday Peak Hour Turning Movement Volumes (2004)

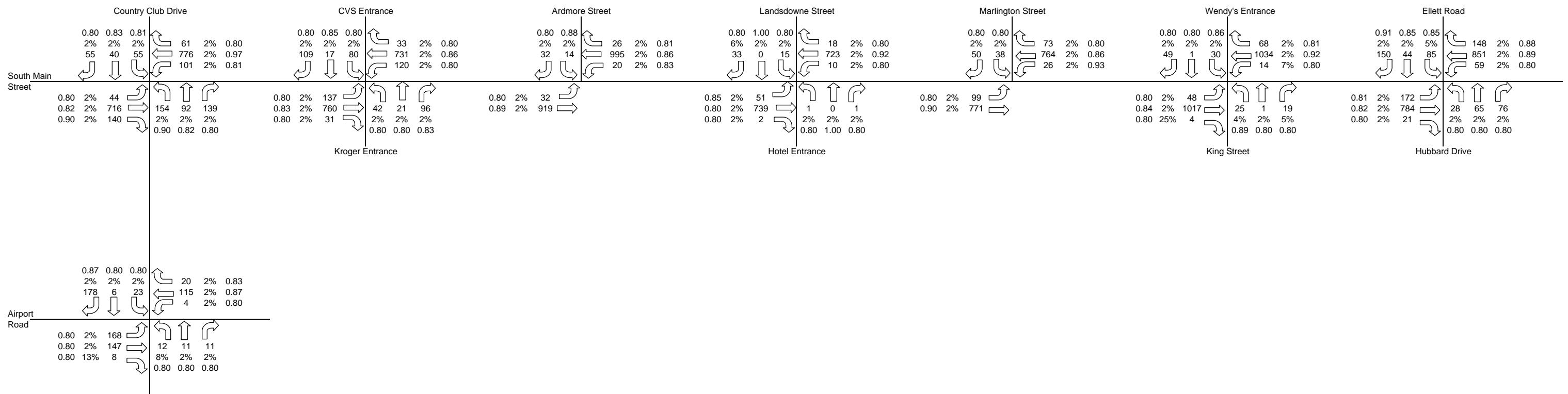


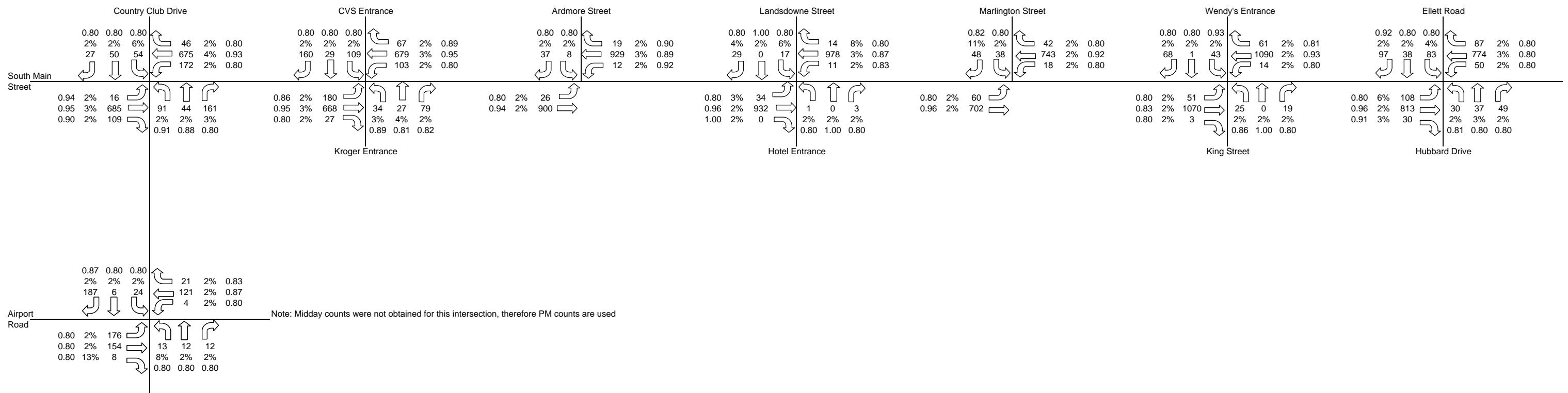
Figure 10: PM Peak Hour Turning Movement Volumes (2004)



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Legend

XX - Peak Hour Volume

XX% - Percent Heavy Vehicles (Minimum 2% Used in Analysis)

X.XX - Peak Hour Factor (Minimum 0.80 PHF Used in Analysis)

* Due to rounding, slight discrepancies in
volumes balancing may exist.

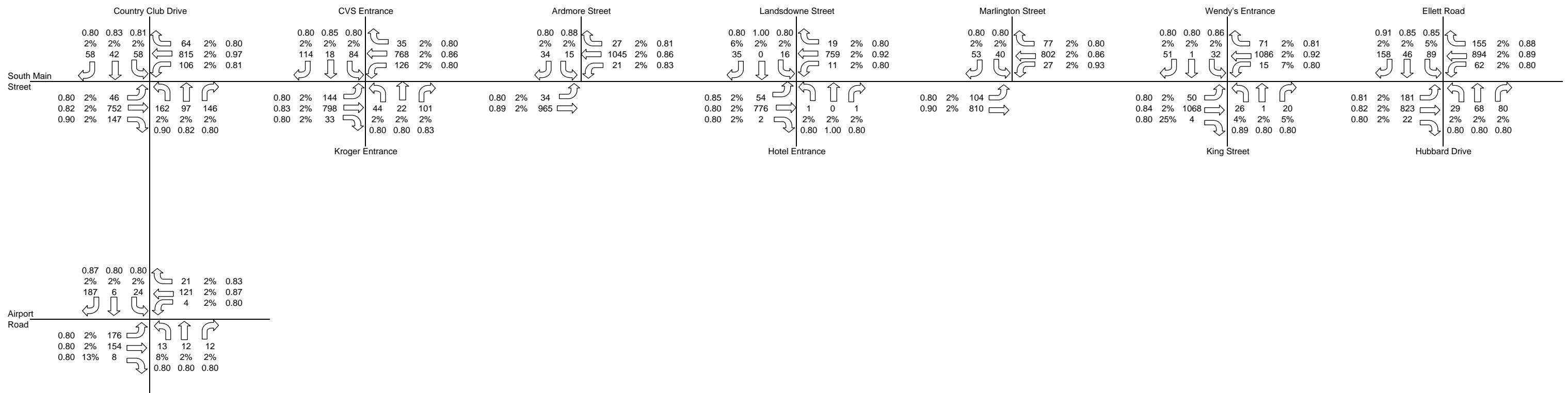


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Figure 11: Midday Existing Peak Hour
Turning Movement Volumes
(2007)

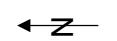


Legend

XX - Peak Hour Volume

XX% - Percent Heavy Vehicles (Minimum 2% Used in Analysis)

X.XX - Peak Hour Factor (Minimum 0.80 PHF Used in Analysis)



* Due to rounding, slight discrepancies in
volumes balancing may exist.

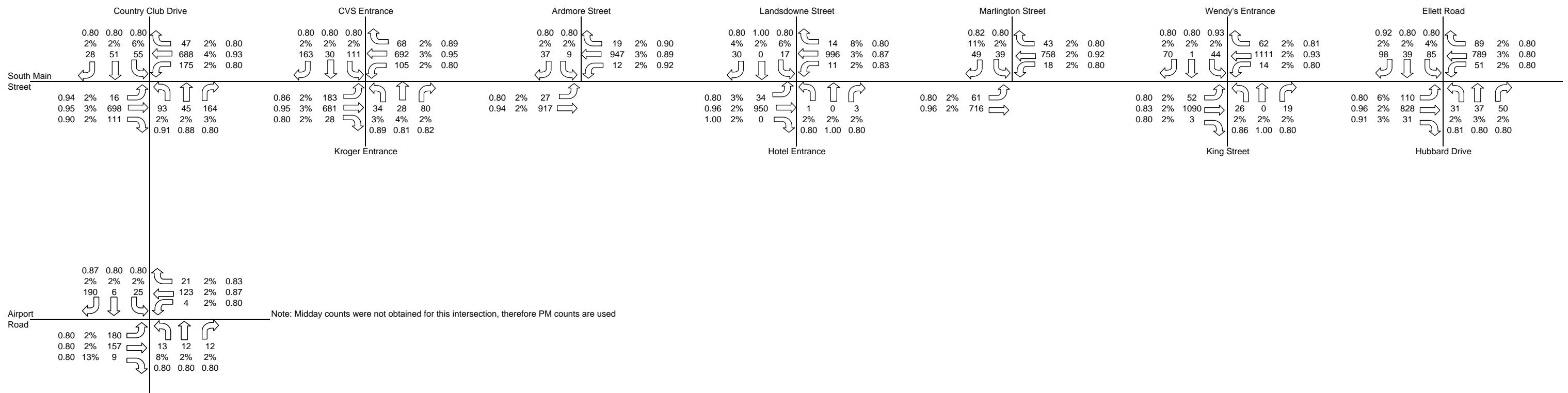


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Figure 12: PM Existing Peak Hour
Turning Movement Volumes
(2007)

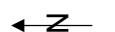


Legend

XX - Peak Hour Volume

XX% - Percent Heavy Vehicles (Minimum 2% Used in Analysis)

X.XX - Peak Hour Factor (Minimum 0.80 PHF Used in Analysis)



* Due to rounding, slight discrepancies in volumes balancing may exist.

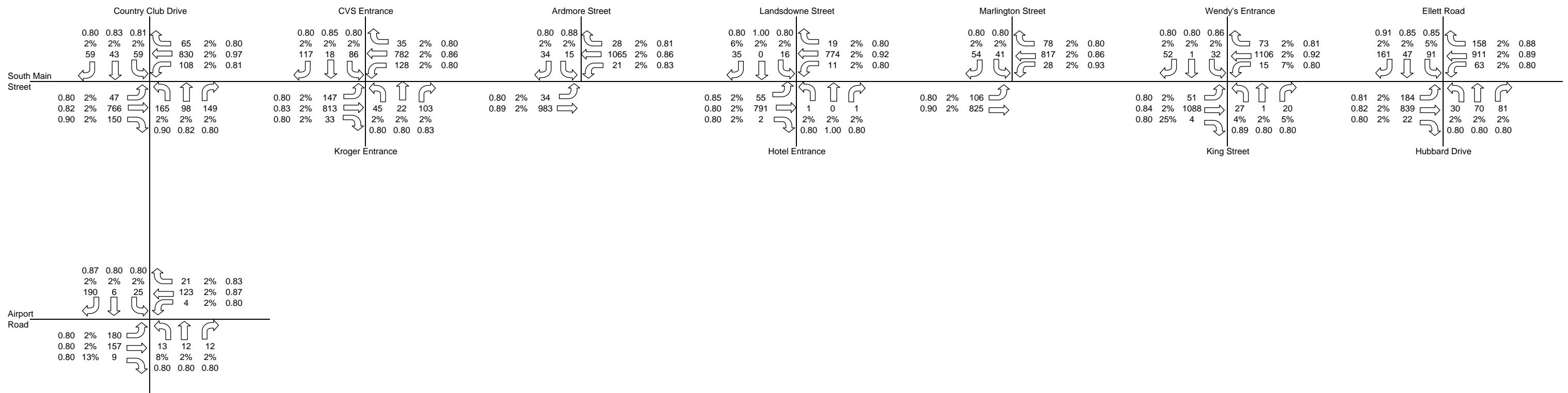


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Figure 13: Midday Background Peak Hour Turning Movement Volumes (2008)



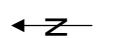
Legend

XX - Peak Hour Volume

XX% - Percent Heavy Vehicles (Minimum 2% Used in Analysis)

X.XX - Peak Hour Factor (Minimum 0.80 PHF Used in Analysis)

* Due to rounding, slight discrepancies in
volumes balancing may exist.

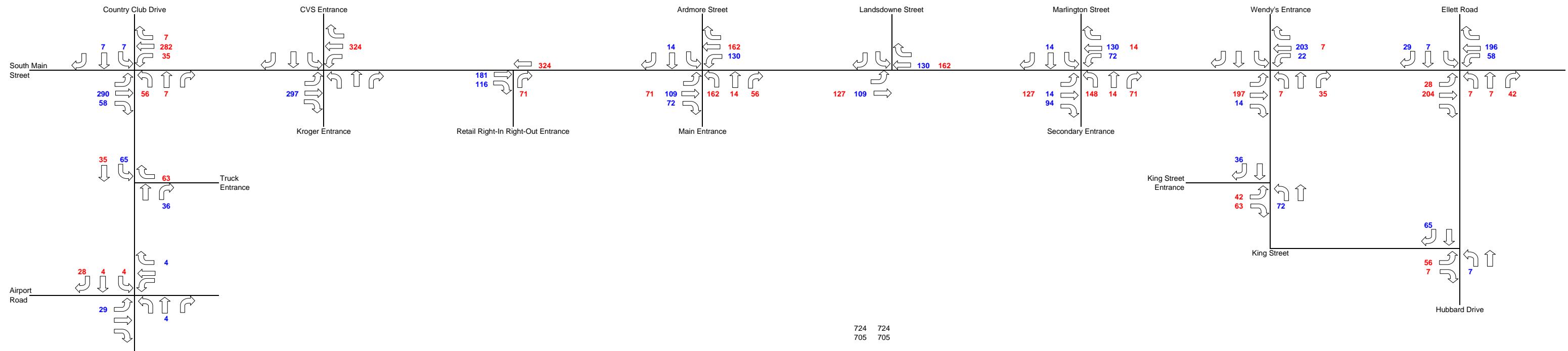


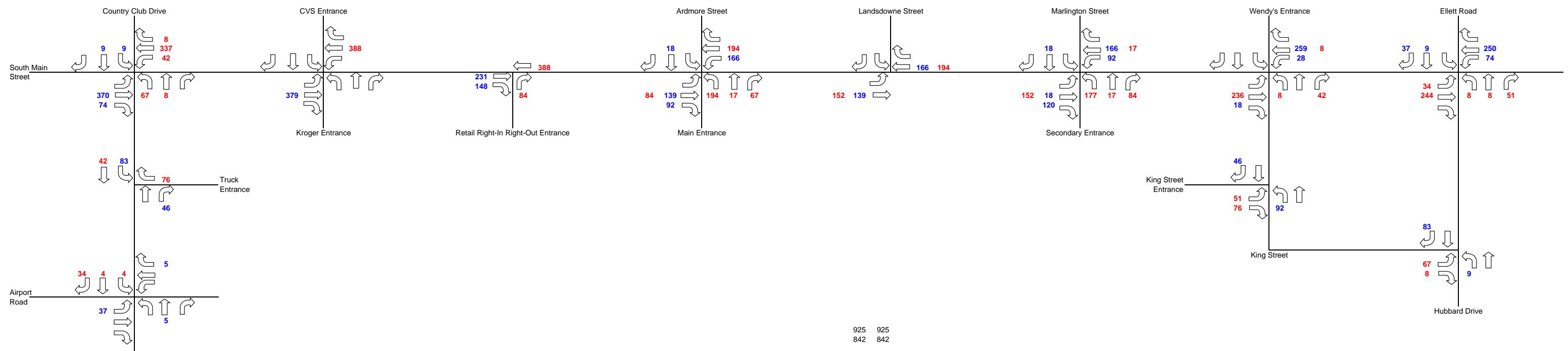
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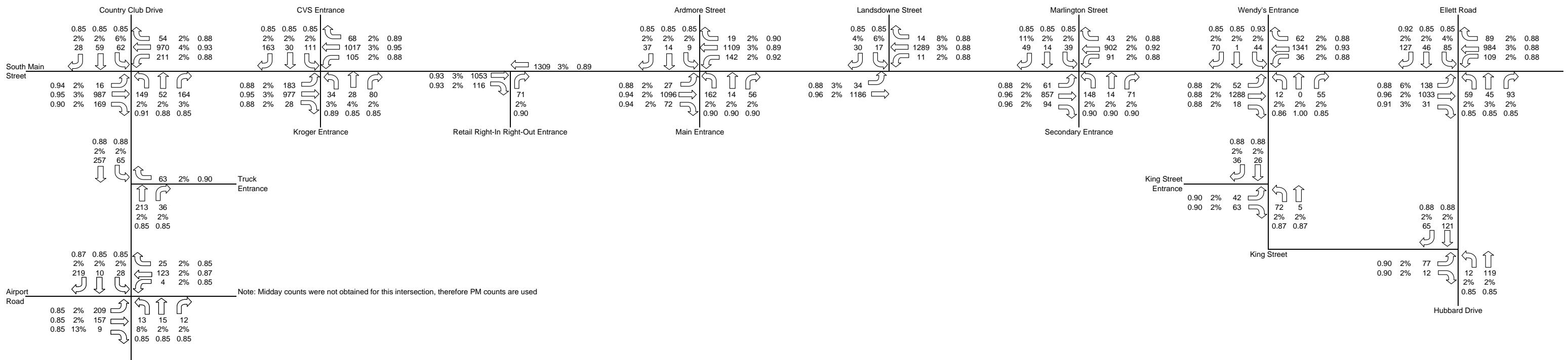
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Scale NTS

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Figure 14: PM Background Peak Hour
Turning Movement Volumes
(2008)







Legend

XX - Peak Hour Volume
 XX% - Percent Heavy Vehicles (Minimum 2% Used in Analysis)
 X.XX - Peak Hour Factor (See Additional Note on PHF)

* Due to rounding, slight discrepancies in volumes balancing may exist.

Notes

*Minimum PHF of 0.85 used on side streets in buildout
 *Minimum PHF of 0.88 used on South Main Street in buildout
 *Minimum PHF of 0.90 used for traffic exiting the proposed development
 *Assumptions on PHF are for the normalizing effect of site traffic and background growth on the peak flow periods of traffic through the study area.

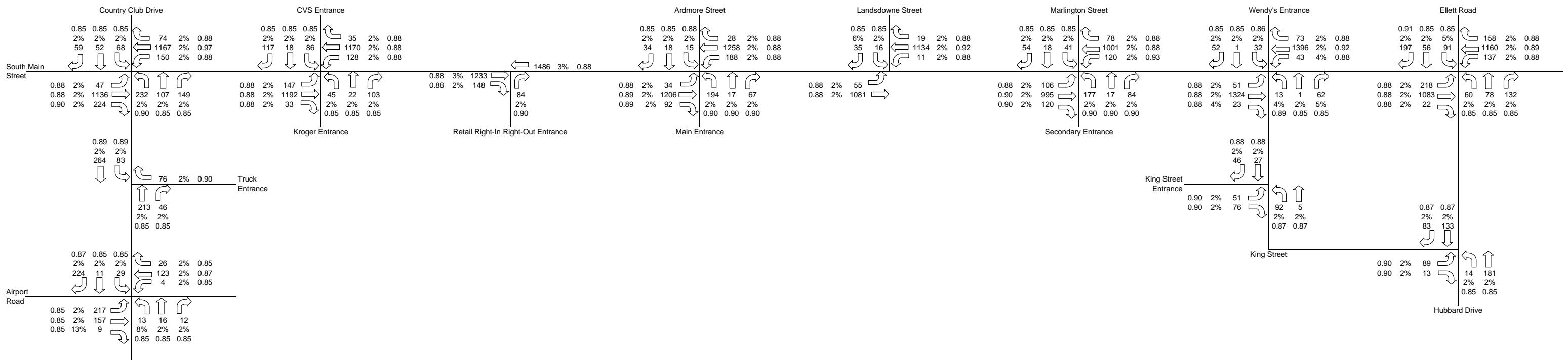


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Figure 17: Midday Buildout Peak Hour Turning Movement Volumes (2008)



Legend

XX - Peak Hour Volume
 XX% - Percent Heavy Vehicles (Minimum 2% Used in Analysis)
 X.XX - Peak Hour Factor (See Additional Note on PHF)

* Due to rounding, slight discrepancies in volumes balancing may exist.

Notes

*Minimum PHF of 0.85 used on side streets in buildout
 *Minimum PHF of 0.88 used on South Main Street in buildout
 *Assumptions on PHF are for the normalizing effect of site traffic and background growth on the peak flow periods of traffic through the study area.

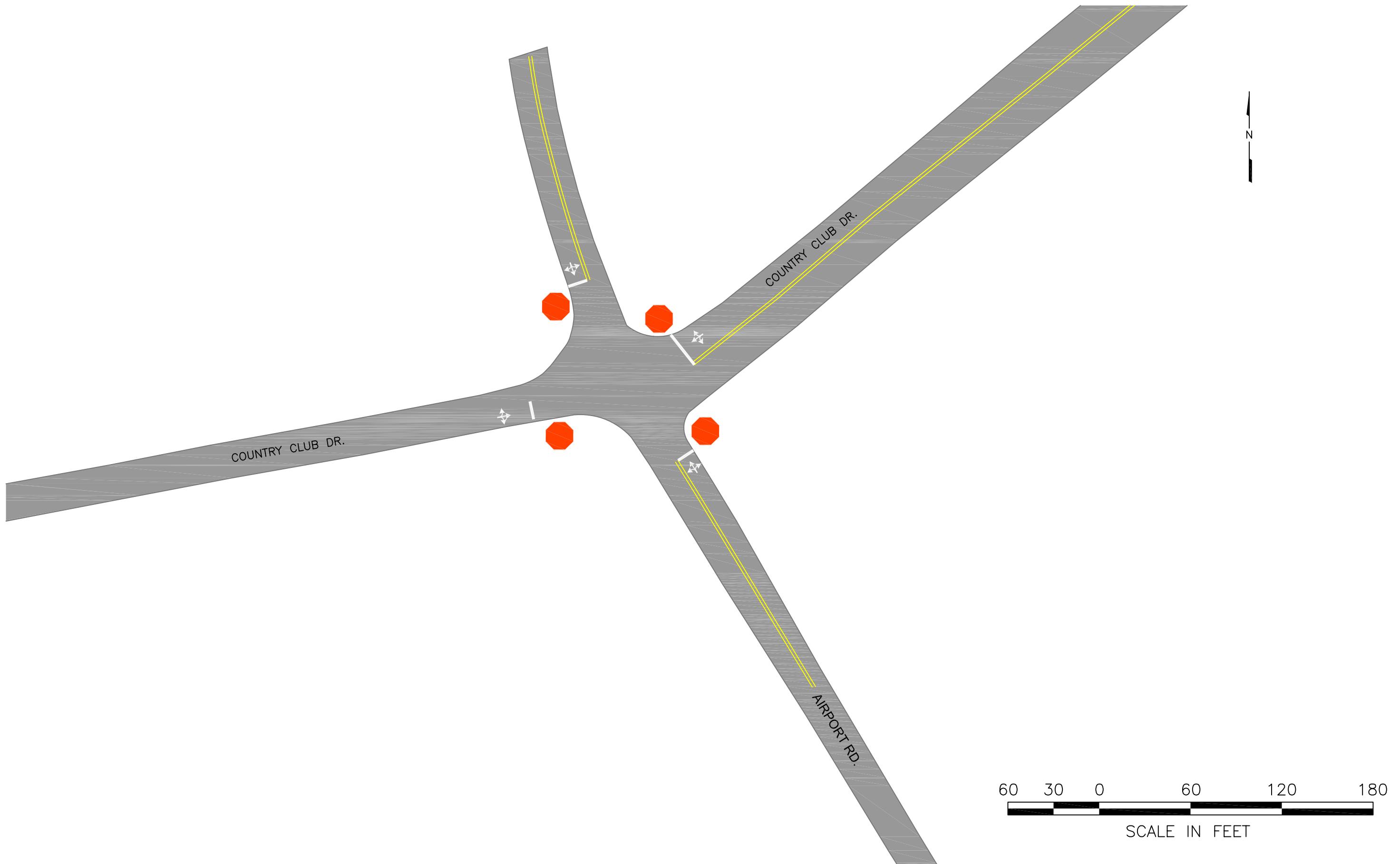


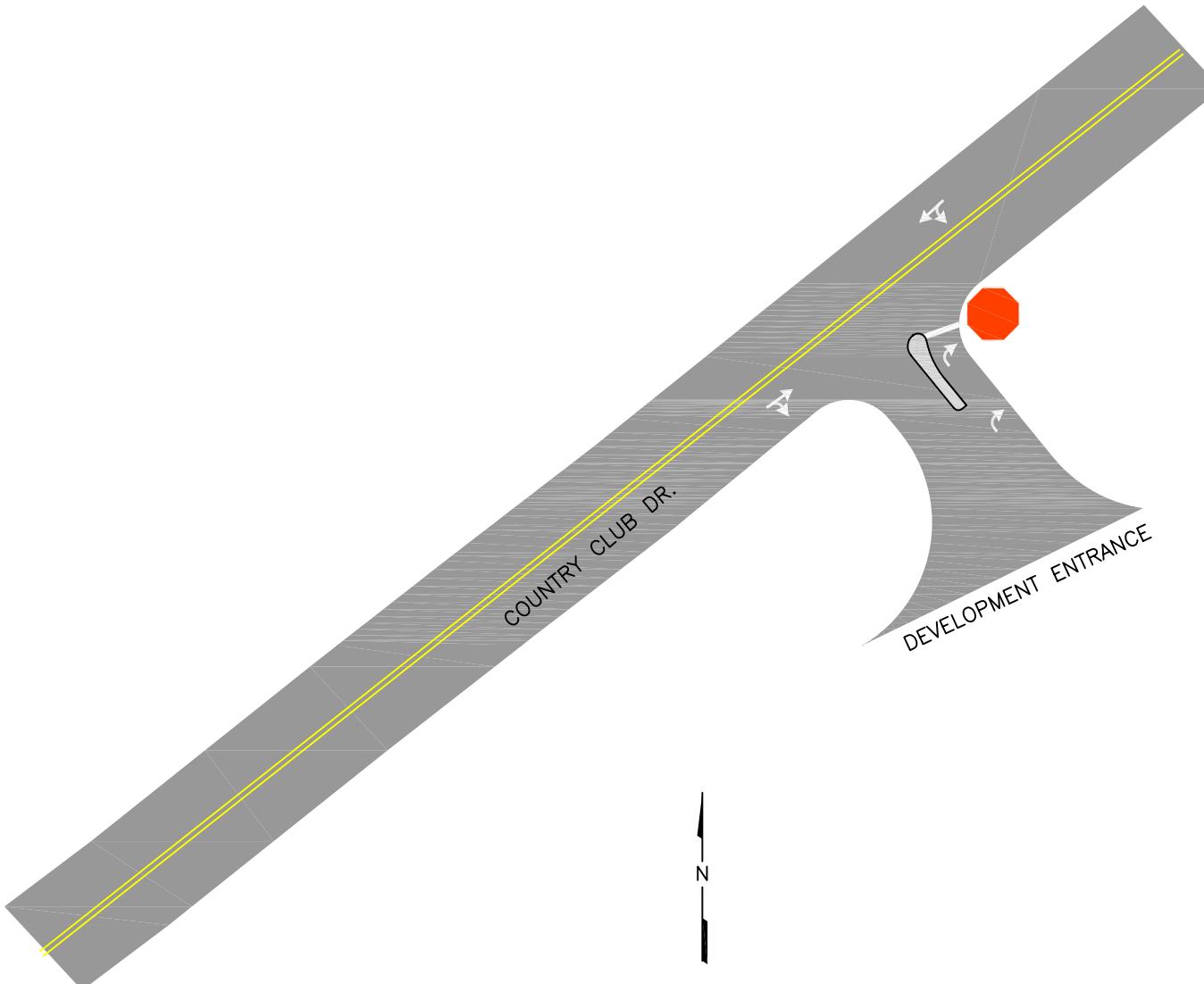
Anderson &
 Associates, Inc.
 Blacksburg, VA

Date: 20-Apr-07
 JN: 22559.41
 Scale NTS

First & Main, Blacksburg - Traffic Impact Study
 Blacksburg, Virginia

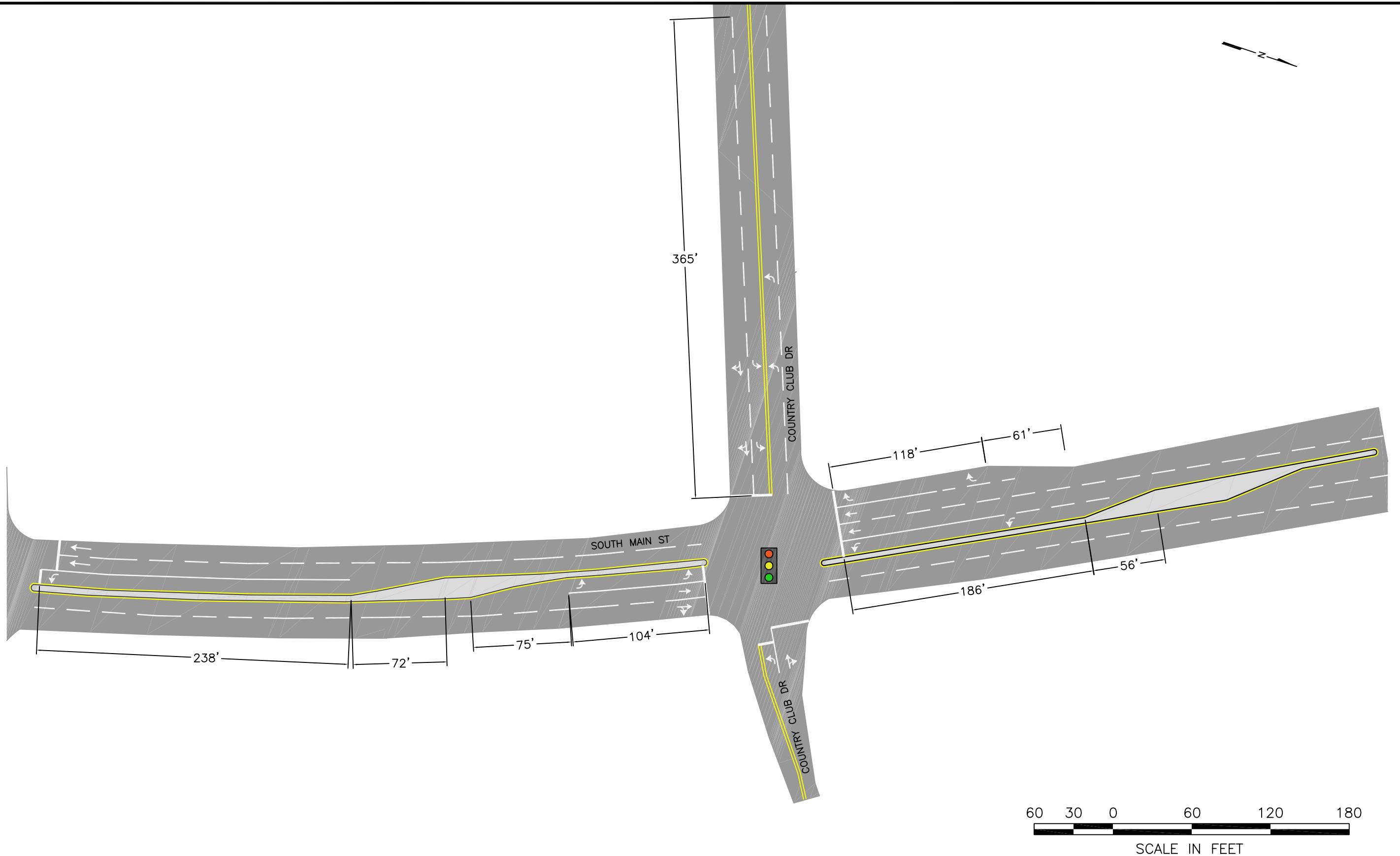
Figure 18: PM Buildout Peak Hour
 Turning Movement Volumes
 (2008)

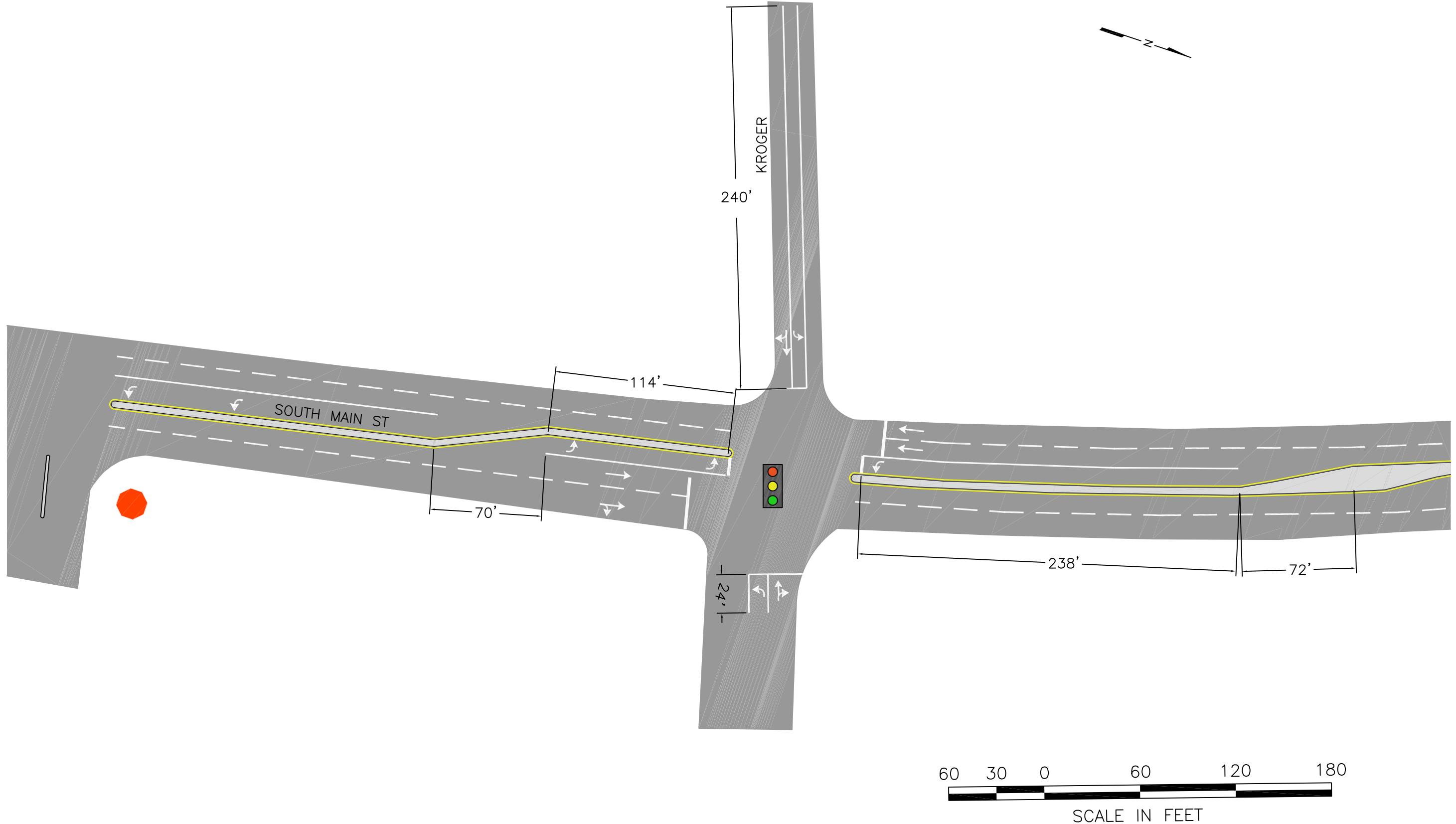




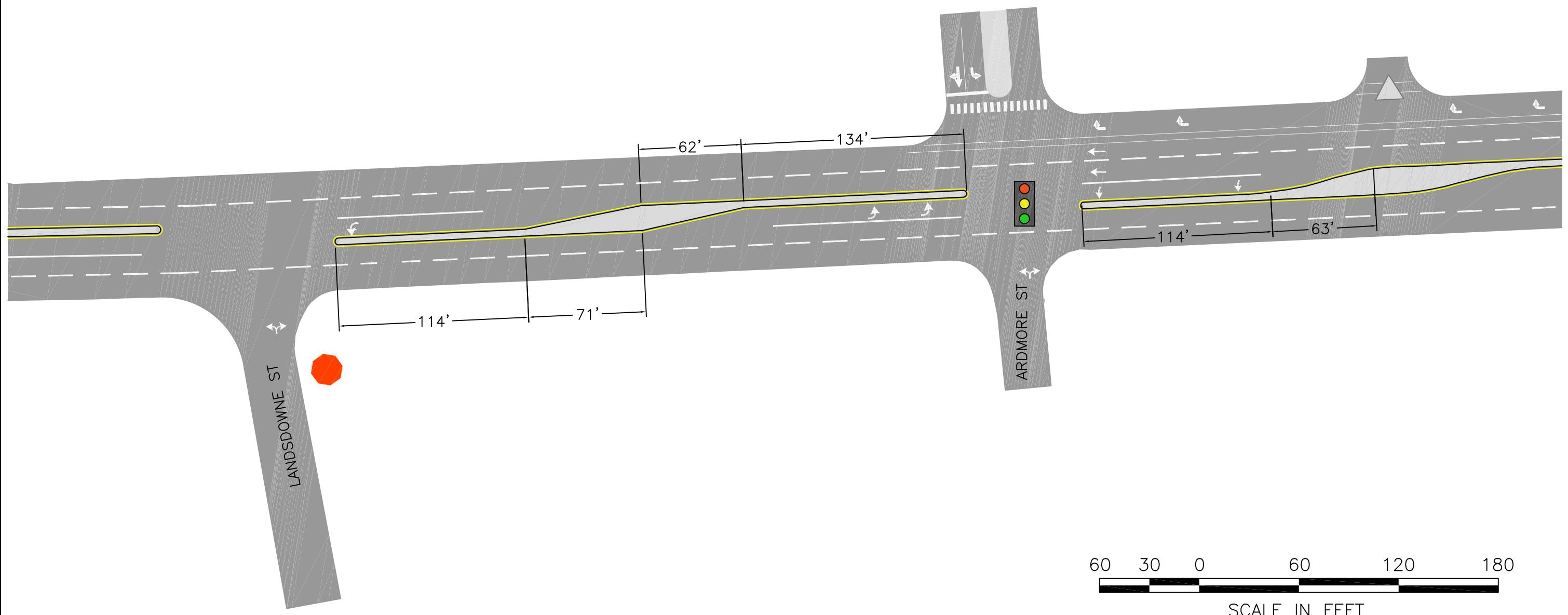
60 30 0 60 120 180
SCALE IN FEET

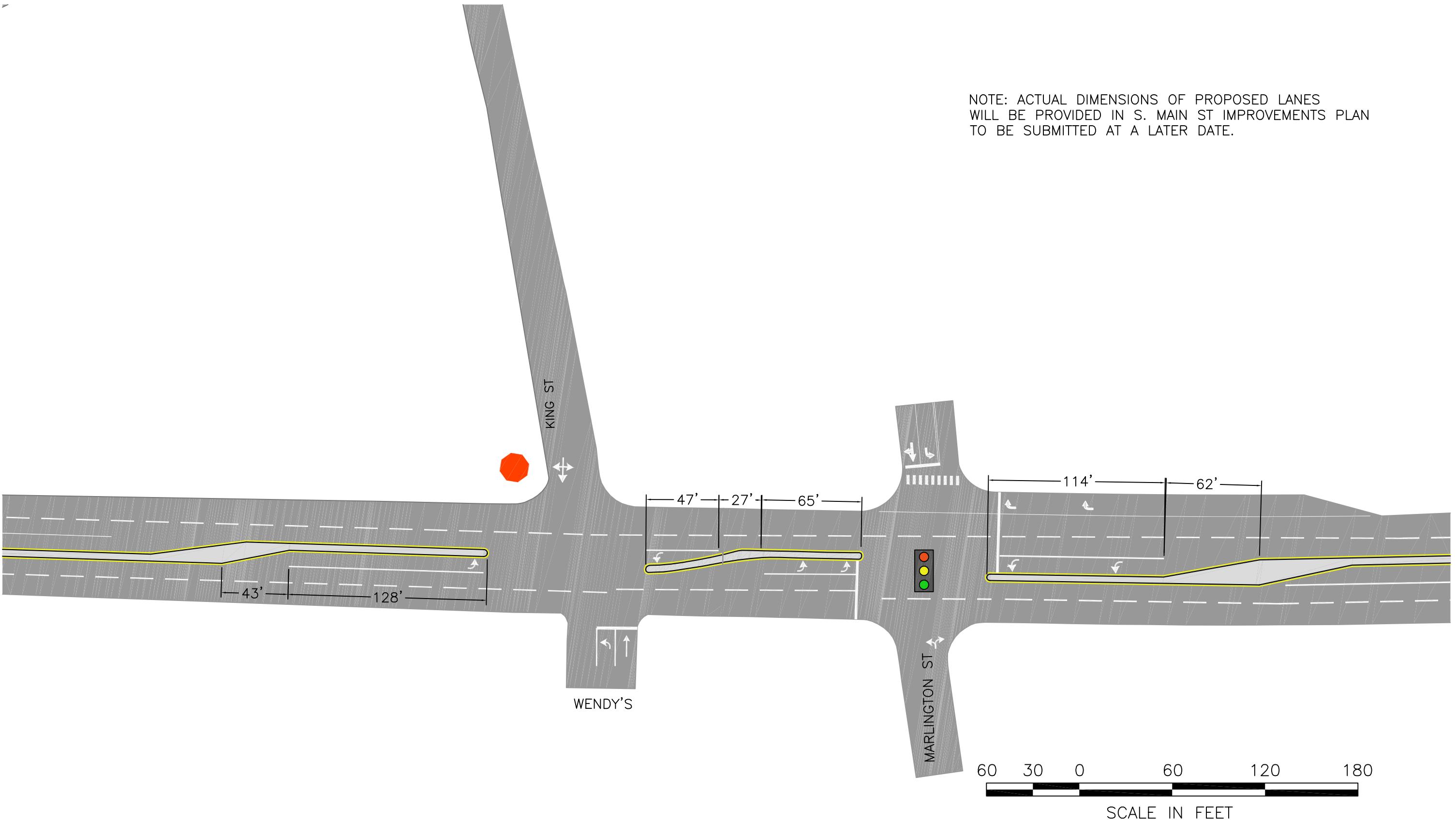
NOTE: ACTUAL DIMENSIONS OF PROPOSED LANES
WILL BE PROVIDED IN S. MAIN ST IMPROVEMENTS PLAN
TO BE SUBMITTED AT A LATER DATE.



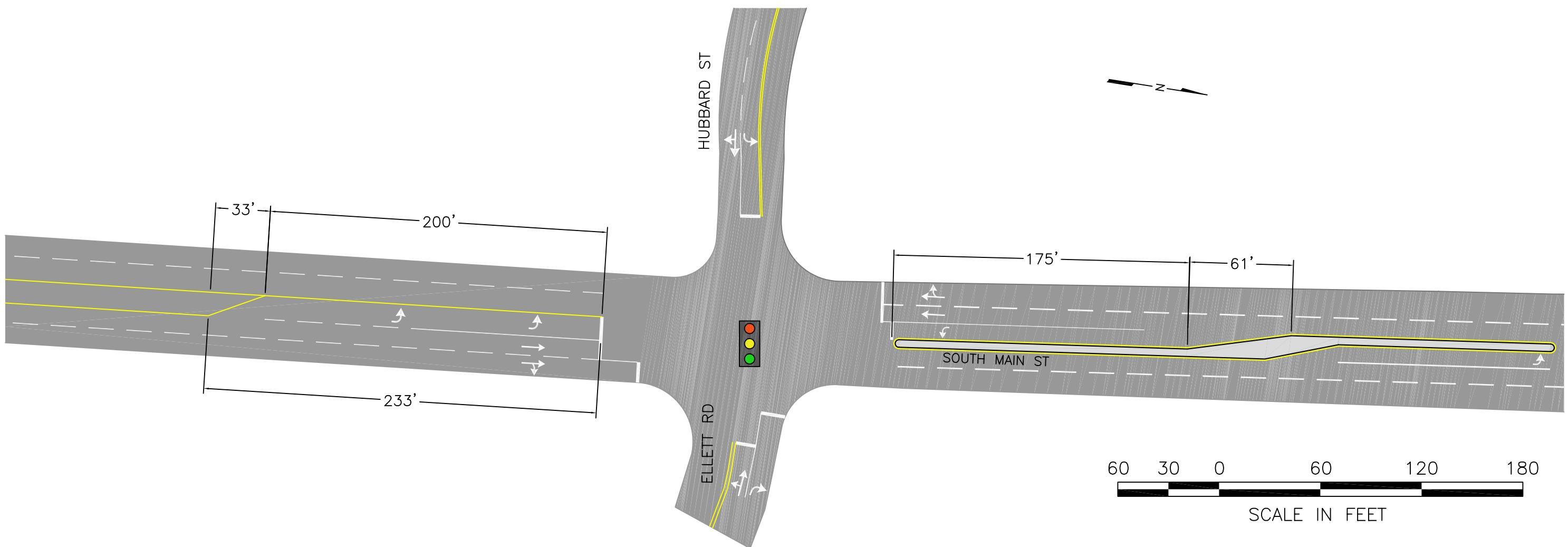
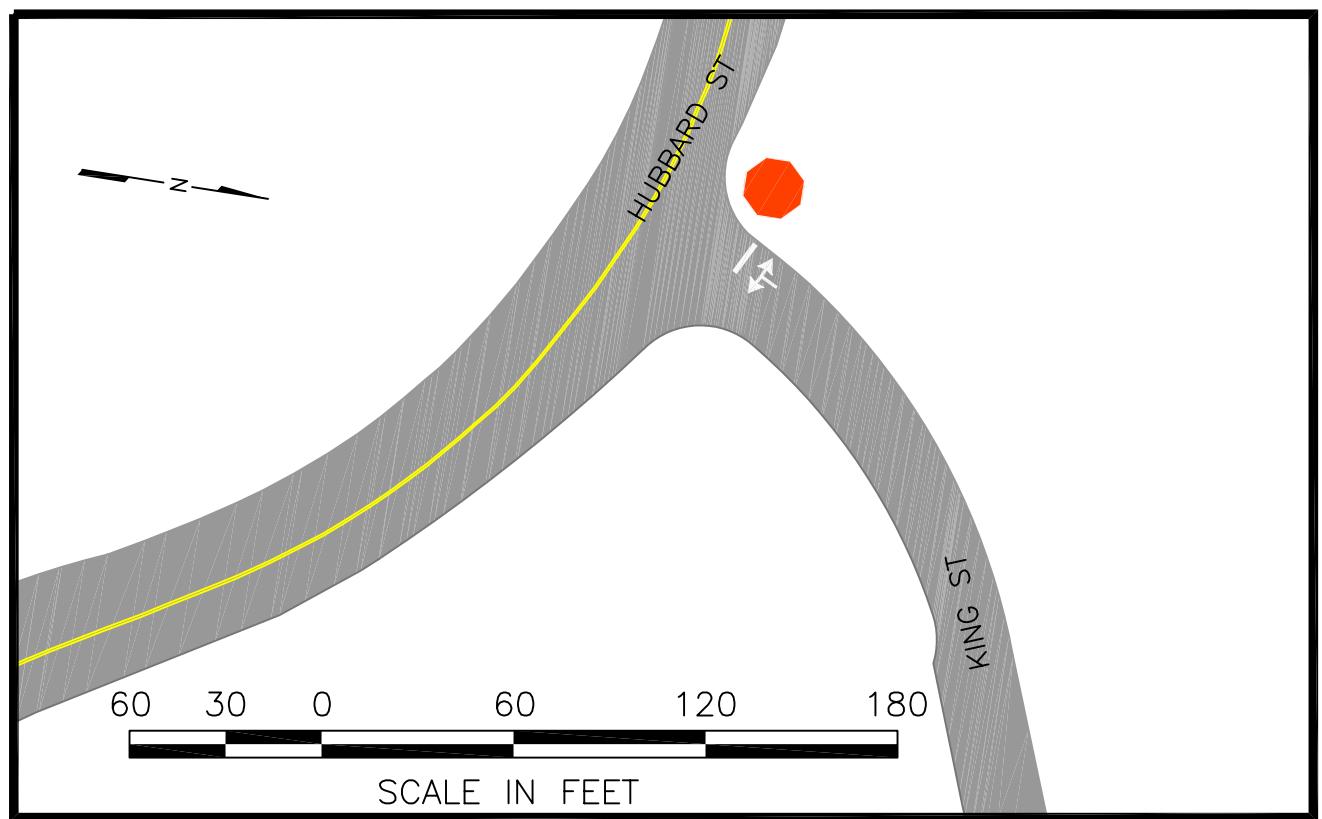


NOTE: ACTUAL DIMENSIONS OF PROPOSED LANES
WILL BE PROVIDED IN S. MAIN ST IMPROVEMENTS PLAN
TO BE SUBMITTED AT A LATER DATE.





NOTE: ACTUAL DIMENSIONS OF PROPOSED LANES
WILL BE PROVIDED IN S. MAIN ST IMPROVEMENTS PLAN
TO BE SUBMITTED AT A LATER DATE.



Appendix A

HCS Analysis Results

Existing Year 2004

Country Club Drive & Airport Road
Ardmore Street & South Main Street
Landsdowne Street & South Main Street
Marlington Street & South Main Street
King Street/Wendy's & South Main Street

Projected Year 2007 (without site traffic)

Country Club Drive & Airport Road
Ardmore Street & South Main Street
Landsdowne Street & South Main Street
Marlington Street & South Main Street
King Street/Wendy's & South Main Street

Background Year 2008 (without site traffic)

Country Club Drive & Airport Road
Ardmore Street & South Main Street
Landsdowne Street & South Main Street
Marlington Street & South Main Street
King Street/Wendy's & South Main Street

Buildout Year 2008 (with site traffic)

Country Club Drive & Airport Road
Ardmore Street & South Main Street
Landsdowne Street & South Main Street
Marlington Street & South Main Street
King Street/Wendy's & South Main Street
Site Entrance & Country Club Drive
Site Entrance & South Main Street
Site Entrance & King Street
King Street & Hubbard Street

ALL-WAY STOP CONTROL ANALYSIS							
General Information				Site Information			
Analyst	John Holst	Intersection	Country Club & Airport				
Agency/Co.	Anderson & Associates	Jurisdiction	Town of Blacksburg				
Date Performed	03-21-2007	Analysis Year	2004 Existing				
Analysis Time Period	Midday Peak						
Project ID	First & Main, Blacksburg						
East/West Street:	Country Club Drive	North/South Street:	Airport Road				
Volume Adjustments and Site Characteristics							
Approach	Eastbound			Westbound			
Movement	L	T	R	L	T	R	
Volume (veh/h)	12	11	11	23	6	178	
%Thrus Left Lane							
Approach	Northbound			Southbound			
Movement	L	T	R	L	T	R	
Volume (veh/h)	4	115	20	168	147	8	
%Thrus Left Lane							
		Eastbound		Westbound		Northbound	
		L1	L2	L1	L2	L1	L2
Configuration	LTR			LTR		LTR	
PHF	0.80			0.86		0.86	
Flow Rate (veh/h)	40			238		160	
% Heavy Vehicles	3			2		2	
No. Lanes	1			1		1	
Geometry Group	1			1		1	
Duration, T				0.25			
Saturation Headway Adjustment Worksheet							
Prop. Left-Turns	0.3		0.1		0.0		0.5
Prop. Right-Turns	0.3		0.9		0.1		0.0
Prop. Heavy Vehicle	0.0		0.0		0.0		0.0
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	-0.1		-0.5		-0.0		0.1
Departure Headway and Service Time							
hd, initial value (s)	3.20		3.20		3.20		3.20
x, initial	0.04		0.21		0.14		0.36
hd, final value (s)	5.69		4.95		5.16		5.00
x, final value	0.06		0.33		0.23		0.56
Move-up time, m (s)	2.0		2.0		2.0		2.0
Service Time, t _s (s)	3.7		3.0		3.2		3.0
Capacity and Level of Service							
		Eastbound		Westbound		Northbound	
		L1	L2	L1	L2	L1	L2
Capacity (veh/h)	290		488		410		651
Delay (s/veh)	9.07		10.34		9.69		14.11
LOS	A		B		A		B
Approach: Delay (s/veh)	9.07		10.34		9.69		14.11
LOS	A		B		A		B
Intersection Delay (s/veh)				11.96			
Intersection LOS				B			

ALL-WAY STOP CONTROL ANALYSIS							
General Information				Site Information			
Analyst	John Holst			Intersection	Country Club & Airport		
Agency/Co.	Anderson & Associates			Jurisdiction	Town of Blacksburg		
Date Performed	03-21-2007			Analysis Year	2004 Existing		
Analysis Time Period	PM Peak						
Project ID First & Main, Blacksburg							
East/West Street: Country Club Drive				North/South Street: Airport Road			
Volume Adjustments and Site Characteristics							
Approach	Eastbound			Westbound			
	Movement	L	T	R	L	T	R
Volume (veh/h)	12	11	11	23	6	178	
%Thrus Left Lane							
Approach	Northbound			Southbound			
	Movement	L	T	R	L	T	R
Volume (veh/h)	4	115	20	168	147	8	
%Thrus Left Lane							
	Eastbound		Westbound		Northbound		Southbound
		L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR
PHF	0.80		0.86		0.86		0.80
Flow Rate (veh/h)	40		238		160		401
% Heavy Vehicles	3		2		2		2
No. Lanes	1		1		1		1
Geometry Group	1		1		1		1
Duration, T	0.25						
Saturation Headway Adjustment Worksheet							
Prop. Left-Turns	0.3		0.1		0.0		0.5
Prop. Right-Turns	0.3		0.9		0.1		0.0
Prop. Heavy Vehicle	0.0		0.0		0.0		0.0
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	-0.1		-0.5		-0.0		0.1
Departure Headway and Service Time							
hd, initial value (s)	3.20		3.20		3.20		3.20
x, initial	0.04		0.21		0.14		0.36
hd, final value (s)	5.69		4.95		5.16		5.00
x, final value	0.06		0.33		0.23		0.56
Move-up time, m (s)	2.0		2.0		2.0		2.0
Service Time, t _s (s)	3.7		3.0		3.2		3.0
Capacity and Level of Service							
	Eastbound		Westbound		Northbound		Southbound
		L1	L2	L1	L2	L1	L2
Capacity (veh/h)	290		488		410		651
Delay (s/veh)	9.07		10.34		9.69		14.11
LOS	A		B		A		B
Approach: Delay (s/veh)	9.07		10.34		9.69		14.11
LOS	A		B		A		B
Intersection Delay (s/veh)	11.96						
Intersection LOS	B						

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	John Holst		Intersection	South Main & Ardmore			
Agency/Co.	Anderson & Associates		Jurisdiction	Town of Blacksburg			
Date Performed	03-21-2007		Analysis Year	2004 Existing			
Analysis Time Period	Midday Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	Ardmore Street		North/South Street:	South Main Street			
Intersection Orientation:	North-South		Study Period (hrs):	0.25			
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	6
		L	T	R	L	T	R
Volume (veh/h)		11	885	18	25	857	
Peak-Hour Factor, PHF		0.92	0.89	0.90	0.80	0.94	1.00
Hourly Flow Rate, HFR (veh/h)		0	0	0	9	0	43
Percent Heavy Vehicles		2	--	--	2	--	--
Median Type	Raised curb						
RT Channelized				0			0
Lanes		1	2	0	1	2	0
Configuration		L	T	TR	L	T	
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	12
		L	T	R	L	T	R
Volume (veh/h)					8		35
Peak-Hour Factor, PHF		1.00	1.00	1.00	0.80	1.00	0.80
Hourly Flow Rate, HFR (veh/h)		31	911	0	11	994	20
Percent Heavy Vehicles		0	0	0	2	2	2
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0			0
Lanes		0	0	0	0	0	0
Configuration						LR	
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L		LR		
v (veh/h)		11	31		52		
C (m) (veh/h)		740	676		411		
v/c		0.01	0.05		0.13		
95% queue length		0.05	0.14		0.43		
Control Delay (s/veh)		9.9	10.6		15.0		
LOS		A	B		C		
Approach Delay (s/veh)		--	--		15.0		
Approach LOS		--	--		C		

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	John Holst		Intersection	South Main & Ardmore			
Agency/Co.	Anderson & Associates		Jurisdiction	Town of Blacksburg			
Date Performed	03-21-2007		Analysis Year	2004 Existing			
Analysis Time Period	PM Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	Ardmore Street		North/South Street:	South Main Street			
Intersection Orientation:	North-South		Study Period (hrs):	0.25			
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	6
		L	T	R	L	T	R
Volume (veh/h)		20	995	26	32	919	
Peak-Hour Factor, PHF		0.83	0.86	0.81	0.80	0.89	1.00
Hourly Flow Rate, HFR (veh/h)		0	0	0	15	0	39
Percent Heavy Vehicles		2	--	--	2	--	--
Median Type	Raised curb						
RT Channelized				0			0
Lanes		1	2	0	1	2	0
Configuration		L	T	TR	L	T	
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	12
		L	T	R	L	T	R
Volume (veh/h)					14		32
Peak-Hour Factor, PHF		1.00	1.00	1.00	0.88	1.00	0.80
Hourly Flow Rate, HFR (veh/h)		39	1032	0	24	1156	32
Percent Heavy Vehicles		0	0	0	2	2	2
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0			0
Lanes		0	0	0	0	0	0
Configuration						LR	
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L		LR		
v (veh/h)		24	39		54		
C (m) (veh/h)		659	583		303		
v/c		0.04	0.07		0.18		
95% queue length		0.11	0.21		0.64		
Control Delay (s/veh)		10.7	11.6		19.4		
LOS		B	B		C		
Approach Delay (s/veh)		--	--		19.4		
Approach LOS		--	--		C		

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	John Holst			Intersection	South Main & Landsdowne		
Agency/Co.	Anderson & Associates			Jurisdiction	Town of Blacksburg		
Date Performed	03-31-2007			Analysis Year	2004 Existing		
Analysis Time Period	Midday Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	Landsdowne Street			North/South Street:	South Main Street		
Intersection Orientation:	North-South			Study Period (hrs):	0.25		
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	6
		L	T	R	L	T	R
Volume (veh/h)		10	931	13	32	888	0
Peak-Hour Factor, PHF		0.83	0.87	0.80	0.80	0.96	1.00
Hourly Flow Rate, HFR (veh/h)		1	0	3	19	0	34
Percent Heavy Vehicles		2	--	--	3	--	--
Median Type	Raised curb						
RT Channelized				0			0
Lanes		1	2	0	1	2	0
Configuration		L	T	TR	L	T	TR
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	12
		L	T	R	L	T	R
Volume (veh/h)		1	0	3	16	0	28
Peak-Hour Factor, PHF		0.80	1.00	0.80	0.80	1.00	0.80
Hourly Flow Rate, HFR (veh/h)		39	925	0	12	1070	16
Percent Heavy Vehicles		2	2	2	6	2	4
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0			0
Lanes		0	1	0	0	1	0
Configuration			LTR			LTR	
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L		LTR		LTR
v (veh/h)		12	39		53		4
C (m) (veh/h)		734	632		274		348
v/c		0.02	0.06		0.19		0.01
95% queue length		0.05	0.20		0.70		0.03
Control Delay (s/veh)		10.0	11.1		21.3		15.5
LOS		A	B		C		C
Approach Delay (s/veh)		--	--		21.3		15.5
Approach LOS		--	--		C		C

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	John Holst			Intersection	South Main & Landsdowne		
Agency/Co.	Anderson & Associates			Jurisdiction	Town of Blacksburg		
Date Performed	03-21-2007			Analysis Year	2004 Existing		
Analysis Time Period	PM Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	Landsdowne Street			North/South Street:	South Main Street		
Intersection Orientation:	North-South			Study Period (hrs):	0.25		
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	6
		L	T	R	L	T	R
Volume (veh/h)		10	723	18	51	739	2
Peak-Hour Factor, PHF		0.80	0.92	0.80	0.85	0.80	0.80
Hourly Flow Rate, HFR (veh/h)		1	0	1	18	0	41
Percent Heavy Vehicles		2	--	--	2	--	--
Median Type	Raised curb						
RT Channelized				0			0
Lanes		1	2	0	1	2	0
Configuration		L	T	TR	L	T	TR
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	12
		L	T	R	L	T	R
Volume (veh/h)		1	0	1	15	0	33
Peak-Hour Factor, PHF		0.80	1.00	0.80	0.80	1.00	0.80
Hourly Flow Rate, HFR (veh/h)		59	923	2	12	785	22
Percent Heavy Vehicles		2	2	2	2	2	6
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0			0
Lanes		0	1	0	0	1	0
Configuration			LTR			LTR	
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L		LTR		LTR
v (veh/h)		12	59		59		2
C (m) (veh/h)		724	806		374		256
v/c		0.02	0.07		0.16		0.01
95% queue length		0.05	0.24		0.55		0.02
Control Delay (s/veh)		10.1	9.8		16.4		19.2
LOS		B	A		C		C
Approach Delay (s/veh)		--	--		16.4		19.2
Approach LOS		--	--		C		C

TWO-WAY STOP CONTROL SUMMARY							
General Information			Site Information				
Analyst	John Holst		Intersection	South Main & Marlington			
Agency/Co.	Anderson & Associates		Jurisdiction	Town of Blacksburg			
Date Performed	03-21-2007		Analysis Year	2004 Existing			
Analysis Time Period	Midday Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	Marlington Street		North/South Street:	South Main Street			
Intersection Orientation:	North-South		Study Period (hrs):	0.25			
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	
		L	T	R	L	T	
Volume (veh/h)		17	708	40	57	669	
Peak-Hour Factor, PHF		0.80	0.92	0.80	0.80	0.96	
Hourly Flow Rate, HFR (veh/h)		0	0	0	44	0	
Percent Heavy Vehicles		2	--	--	2	--	
Median Type	Raised curb						
RT Channelized				0		0	
Lanes		1	2	0	1	2	
Configuration		L	T	TR	L	T	
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	
		L	T	R	L	T	
Volume (veh/h)					36	46	
Peak-Hour Factor, PHF		1.00	1.00	1.00	0.80	1.00	
Hourly Flow Rate, HFR (veh/h)		71	696	0	21	769	
Percent Heavy Vehicles		0	0	0	2	0	
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0		0	
Lanes		0	0	0	0	0	
Configuration						LR	
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L		LR		
v (veh/h)		21	71		100		
C (m) (veh/h)		894	806		369		
v/c		0.02	0.09		0.27		
95% queue length		0.07	0.29		1.08		
Control Delay (s/veh)		9.1	9.9		18.3		
LOS		A	A		C		
Approach Delay (s/veh)		--	--		18.3		
Approach LOS		--	--		C		

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	John Holst			Intersection	South Main & Marlington		
Agency/Co.	Anderson & Associates			Jurisdiction	Town of Blacksburg		
Date Performed	03-21-2007			Analysis Year	2004 Existing		
Analysis Time Period	PM Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	Marlington Street			North/South Street:	South Main Street		
Intersection Orientation:	North-South			Study Period (hrs):	0.25		
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	6
		L	T	R	L	T	R
Volume (veh/h)		26	764	73	99	771	
Peak-Hour Factor, PHF		0.93	0.86	0.80	0.80	0.90	1.00
Hourly Flow Rate, HFR (veh/h)		0	0	0	47	0	62
Percent Heavy Vehicles		2	--	--	2	--	--
Median Type	Raised curb						
RT Channelized				0			0
Lanes		1	2	0	1	2	0
Configuration		L	T	TR	L	T	
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	12
		L	T	R	L	T	R
Volume (veh/h)					38		50
Peak-Hour Factor, PHF		1.00	1.00	1.00	0.80	1.00	0.80
Hourly Flow Rate, HFR (veh/h)		123	856	0	27	888	91
Percent Heavy Vehicles		0	0	0	2	0	2
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0			0
Lanes		0	0	0	0	0	0
Configuration						LR	
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L		LR		
v (veh/h)		27	123		109		
C (m) (veh/h)		767	701		291		
v/c		0.04	0.18		0.37		
95% queue length		0.11	0.63		1.67		
Control Delay (s/veh)		9.9	11.2		24.6		
LOS		A	B		C		
Approach Delay (s/veh)		--	--		24.6		
Approach LOS		--	--		C		

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	John Holst		Intersection	South Main & King		Jurisdiction	Town of Blacksburg
Agency/Co.	Anderson & Associates		Analysis Year	2004 Existing			
Date Performed	03-21-2007						
Analysis Time Period	Midday Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	King Street		North/South Street:	South Main Street			
Intersection Orientation:	North-South		Study Period (hrs):	0.25			
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	6
		L	T	R	L	T	R
Volume (veh/h)		13	1038	58	49	1019	3
Peak-Hour Factor, PHF		0.80	0.93	0.81	0.80	0.83	0.80
Hourly Flow Rate, HFR (veh/h)		27	0	22	44	1	81
Percent Heavy Vehicles		2	--	--	2	--	--
Median Type	Raised curb						
RT Channelized				0			0
Lanes		1	2	0	1	2	0
Configuration		L	T	TR	L	T	TR
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	12
		L	T	R	L	T	R
Volume (veh/h)		24	0	18	41	1	65
Peak-Hour Factor, PHF		0.86	1.00	0.80	0.93	0.80	0.80
Hourly Flow Rate, HFR (veh/h)		61	1227	3	16	1116	71
Percent Heavy Vehicles		2	2	2	2	2	2
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0			0
Lanes		0	1	0	1	1	0
Configuration			LTR		L		TR
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L	L		TR	LTR
v (veh/h)		16	61	44		82	49
C (m) (veh/h)		562	584	124		431	153
v/c		0.03	0.10	0.35		0.19	0.32
95% queue length		0.09	0.35	1.44		0.69	1.29
Control Delay (s/veh)		11.6	11.9	49.2		15.3	39.2
LOS		B	B	E		C	E
Approach Delay (s/veh)		--	--		27.1		39.2
Approach LOS		--	--		D		E

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	John Holst	Intersection	South Main & King				
Agency/Co.	Anderson & Associates	Jurisdiction	Town of Blacksburg				
Date Performed	03-21-2007	Analysis Year	2004 Existing				
Analysis Time Period	PM Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	King Street	North/South Street:	South Main Street				
Intersection Orientation:	North-South	Study Period (hrs):	0.25				
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	6
		L	T	R	L	T	R
Volume (veh/h)		14	1034	58	48	1017	4
Peak-Hour Factor, PHF		0.80	0.92	0.81	0.80	0.84	0.80
Hourly Flow Rate, HFR (veh/h)		28	1	23	34	1	61
Percent Heavy Vehicles		7	--	--	2	--	--
Median Type		Raised curb					
RT Channelized				0			0
Lanes		1	2	0	1	2	0
Configuration		L	T	TR	L	T	TR
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	12
		L	T	R	L	T	R
Volume (veh/h)		25	1	19	30	1	49
Peak-Hour Factor, PHF		0.89	0.80	0.80	0.86	0.80	0.80
Hourly Flow Rate, HFR (veh/h)		59	1210	4	17	1123	71
Percent Heavy Vehicles		4	2	5	2	2	2
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0			0
Lanes		0	1	0	1	1	0
Configuration			LTR		L		TR
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L	L	TR		LTR
v (veh/h)		17	59	34		62	52
C (m) (veh/h)		534	580	123		422	151
v/c		0.03	0.10	0.28		0.15	0.34
95% queue length		0.10	0.34	1.05		0.51	1.41
Control Delay (s/veh)		12.0	11.9	45.1		15.0	40.9
LOS		B	B	E		B	E
Approach Delay (s/veh)		--	--	25.7		40.9	
Approach LOS		--	--	D		E	

ALL-WAY STOP CONTROL ANALYSIS											
General Information				Site Information							
Analyst	John Holst		Intersection		Country Club & Airport						
Agency/Co.	Anderson & Associates		Jurisdiction		Town of Blacksburg						
Date Performed	04-04-2007		Analysis Year		2007 Projected						
Analysis Time Period	Midday Peak										
Project ID JN 22559.40 Boulevards at Blacksburg											
East/West Street: Country Club Drive				North/South Street: Airport Road							
Volume Adjustments and Site Characteristics											
Approach	Eastbound			Westbound							
Movement	L	T	R	L	T	R					
Volume (veh/h)	13	12	12	24	6	187					
%Thrus Left Lane											
Approach	Northbound			Southbound							
Movement	L	T	R	L	T	R					
Volume (veh/h)	4	121	21	176	154	8					
%Thrus Left Lane											
	Eastbound		Westbound		Northbound		Southbound				
	L1	L2	L1	L2	L1	L2	L1				
Configuration	LTR		LTR		LTR		LTR				
PHF	0.80		0.86		0.86		0.80				
Flow Rate (veh/h)	44		250		168		420				
% Heavy Vehicles	3		2		2		2				
No. Lanes	1		1		1		1				
Geometry Group	1		1		1		1				
Duration, T				0.25							
Saturation Headway Adjustment Worksheet											
Prop. Left-Turns	0.4		0.1		0.0		0.5				
Prop. Right-Turns	0.3		0.9		0.1		0.0				
Prop. Heavy Vehicle	0.0		0.0		0.0		0.0				
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2				
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6				
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7				
hadj, computed	-0.1		-0.5		-0.0		0.1				
Departure Headway and Service Time											
hd, initial value (s)	3.20		3.20		3.20		3.20				
x, initial	0.04		0.22		0.15		0.37				
hd, final value (s)	5.83		5.05		5.27		5.08				
x, final value	0.07		0.35		0.25		0.59				
Move-up time, m (s)	2.0		2.0		2.0		2.0				
Service Time, t _s (s)	3.8		3.1		3.3		3.1				
Capacity and Level of Service											
	Eastbound		Westbound		Northbound		Southbound				
	L1	L2	L1	L2	L1	L2	L1				
Capacity (veh/h)	294		500		418		670				
Delay (s/veh)	9.28		10.76		9.98		15.21				
LOS	A		B		A		C				
Approach: Delay (s/veh)	9.28		10.76		9.98		15.21				
LOS	A		B		A		C				
Intersection Delay (s/veh)				12.66							
Intersection LOS				B							

ALL-WAY STOP CONTROL ANALYSIS							
General Information				Site Information			
Analyst	John Holst	Intersection	Country Club & Airport				
Agency/Co.	Anderson & Associates	Jurisdiction	Town of Blacksburg				
Date Performed	04-04-2007	Analysis Year	2007 Projected				
Analysis Time Period	PM Peak						
Project ID	First & Main, Blacksburg						
East/West Street:	Country Club Drive	North/South Street:	Airport Road				
Volume Adjustments and Site Characteristics							
Approach	Eastbound			Westbound			
Movement	L	T	R	L	T	R	
Volume (veh/h)	13	12	12	24	6	187	
%Thrus Left Lane							
Approach	Northbound			Southbound			
Movement	L	T	R	L	T	R	
Volume (veh/h)	4	121	21	176	154	8	
%Thrus Left Lane							
	Eastbound		Westbound		Northbound		Southbound
	L1	L2	L1	L2	L1	L2	L1
Configuration	LTR		LTR		LTR		LTR
PHF	0.80		0.86		0.86		0.80
Flow Rate (veh/h)	44		250		168		420
% Heavy Vehicles	3		2		2		2
No. Lanes	1		1		1		1
Geometry Group	1		1		1		1
Duration, T				0.25			
Saturation Headway Adjustment Worksheet							
Prop. Left-Turns	0.4		0.1		0.0		0.5
Prop. Right-Turns	0.3		0.9		0.1		0.0
Prop. Heavy Vehicle	0.0		0.0		0.0		0.0
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	-0.1		-0.5		-0.0		0.1
Departure Headway and Service Time							
hd, initial value (s)	3.20		3.20		3.20		3.20
x, initial	0.04		0.22		0.15		0.37
hd, final value (s)	5.83		5.05		5.27		5.08
x, final value	0.07		0.35		0.25		0.59
Move-up time, m (s)	2.0		2.0		2.0		2.0
Service Time, t _s (s)	3.8		3.1		3.3		3.1
Capacity and Level of Service							
	Eastbound		Westbound		Northbound		Southbound
	L1	L2	L1	L2	L1	L2	L1
Capacity (veh/h)	294		500		418		670
Delay (s/veh)	9.28		10.76		9.98		15.21
LOS	A		B		A		C
Approach: Delay (s/veh)	9.28		10.76		9.98		15.21
LOS	A		B		A		C
Intersection Delay (s/veh)				12.66			
Intersection LOS				B			

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	John Holst			Intersection	South Main & Ardmore		
Agency/Co.	Anderson & Associates			Jurisdiction	Town of Blacksburg		
Date Performed	04-04-2007			Analysis Year	2007 Projected		
Analysis Time Period	Midday Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	Ardmore Street			North/South Street:	South Main Street		
Intersection Orientation:	North-South			Study Period (hrs):	0.25		
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	6
		L	T	R	L	T	R
Volume (veh/h)		12	929	19	26	900	
Peak-Hour Factor, PHF		0.92	0.89	0.90	0.80	0.94	1.00
Hourly Flow Rate, HFR (veh/h)		0	0	0	9	0	46
Percent Heavy Vehicles		2	--	--	2	--	--
Median Type	Raised curb						
RT Channelized				0			0
Lanes		1	2	0	1	2	0
Configuration		L	T	TR	L	T	
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	12
		L	T	R	L	T	R
Volume (veh/h)					8		37
Peak-Hour Factor, PHF		1.00	1.00	1.00	0.80	1.00	0.80
Hourly Flow Rate, HFR (veh/h)		32	957	0	13	1043	21
Percent Heavy Vehicles		0	0	0	2	2	2
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0			0
Lanes		0	0	0	0	0	0
Configuration						LR	
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L		LR		
v (veh/h)		13	32		55		
C (m) (veh/h)		710	647		396		
v/c		0.02	0.05		0.14		
95% queue length		0.06	0.16		0.48		
Control Delay (s/veh)		10.2	10.9		15.6		
LOS		B	B		C		
Approach Delay (s/veh)		--	--		15.6		
Approach LOS		--	--		C		

TWO-WAY STOP CONTROL SUMMARY							
General Information			Site Information				
Analyst	John Holst		Intersection	South Main & Ardmore			
Agency/Co.	Anderson & Associates		Jurisdiction	Town of Blacksburg			
Date Performed	04-04-2007		Analysis Year	2007 Projected			
Analysis Time Period	PM Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	Ardmore Street		North/South Street:	South Main Street			
Intersection Orientation:	North-South		Study Period (hrs):	0.25			
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	
		L	T	R	L	T	
Volume (veh/h)		21	1045	27	34	965	
Peak-Hour Factor, PHF		0.83	0.86	0.81	0.80	0.89	
Hourly Flow Rate, HFR (veh/h)		0	0	0	17	0	
Percent Heavy Vehicles		2	--	--	2	--	
Median Type	Raised curb						
RT Channelized				0		0	
Lanes		1	2	0	1	2	
Configuration		L	T	TR	L	T	
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	
		L	T	R	L	T	
Volume (veh/h)					15	34	
Peak-Hour Factor, PHF		1.00	1.00	1.00	0.88	1.00	
Hourly Flow Rate, HFR (veh/h)		42	1084	0	25	1215	
Percent Heavy Vehicles		0	0	0	2	2	
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0		0	
Lanes		0	0	0	0	0	
Configuration						LR	
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L		LR		
v (veh/h)		25	42		59		
C (m) (veh/h)		629	553		279		
v/c		0.04	0.08		0.21		
95% queue length		0.12	0.25		0.78		
Control Delay (s/veh)		11.0	12.0		21.3		
LOS		B	B		C		
Approach Delay (s/veh)		--	--		21.3		
Approach LOS		--	--		C		

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	John Holst			Intersection	South Main & Landsdowne		
Agency/Co.	Anderson & Associates			Jurisdiction	Town of Blacksburg		
Date Performed	04-04-2007			Analysis Year	2007 Projected		
Analysis Time Period	Midday Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	Landsdowne Street			North/South Street:	South Main Street		
Intersection Orientation:	North-South			Study Period (hrs):	0.25		
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	6
		L	T	R	L	T	R
Volume (veh/h)		11	978	14	34	932	0
Peak-Hour Factor, PHF		0.83	0.87	0.80	0.80	0.96	1.00
Hourly Flow Rate, HFR (veh/h)		1	0	3	21	0	36
Percent Heavy Vehicles		2	--	--	3	--	--
Median Type	Raised curb						
RT Channelized				0			0
Lanes		1	2	0	1	2	0
Configuration		L	T	TR	L	T	TR
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	12
		L	T	R	L	T	R
Volume (veh/h)		1	0	3	17	0	29
Peak-Hour Factor, PHF		0.80	1.00	0.80	0.80	1.00	0.80
Hourly Flow Rate, HFR (veh/h)		42	970	0	13	1124	17
Percent Heavy Vehicles		2	2	2	6	2	4
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0			0
Lanes		0	1	0	0	1	0
Configuration			LTR			LTR	
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L		LTR		LTR
v (veh/h)		13	42		57		4
C (m) (veh/h)		706	602		252		326
v/c		0.02	0.07		0.23		0.01
95% queue length		0.06	0.22		0.85		0.04
Control Delay (s/veh)		10.2	11.4		23.4		16.2
LOS		B	B		C		C
Approach Delay (s/veh)		--	--		23.4		16.2
Approach LOS		--	--		C		C

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	John Holst			Intersection	South Main & Landsdowne		
Agency/Co.	Anderson & Associates			Jurisdiction	Town of Blacksburg		
Date Performed	04-04-2007			Analysis Year	2007 Projected		
Analysis Time Period	PM Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	Landsdowne Street			North/South Street:	South Main Street		
Intersection Orientation:	North-South			Study Period (hrs):	0.25		
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	6
		L	T	R	L	T	R
Volume (veh/h)		11	759	19	54	776	2
Peak-Hour Factor, PHF		0.80	0.92	0.80	0.85	0.80	0.80
Hourly Flow Rate, HFR (veh/h)		1	0	1	19	0	43
Percent Heavy Vehicles		2	--	--	2	--	--
Median Type	Raised curb						
RT Channelized				0			0
Lanes		1	2	0	1	2	0
Configuration		L	T	TR	L	T	TR
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	12
		L	T	R	L	T	R
Volume (veh/h)		1	0	1	16	0	35
Peak-Hour Factor, PHF		0.80	1.00	0.80	0.80	1.00	0.80
Hourly Flow Rate, HFR (veh/h)		63	969	2	13	824	23
Percent Heavy Vehicles		2	2	2	2	2	6
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0			0
Lanes		0	1	0	0	1	0
Configuration			LTR			LTR	
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L		LTR		LTR
v (veh/h)		13	63		62		2
C (m) (veh/h)		695	778		355		236
v/c		0.02	0.08		0.17		0.01
95% queue length		0.06	0.26		0.62		0.03
Control Delay (s/veh)		10.3	10.0		17.3		20.4
LOS		B	B		C		C
Approach Delay (s/veh)		--	--		17.3		20.4
Approach LOS		--	--		C		C

TWO-WAY STOP CONTROL SUMMARY							
General Information			Site Information				
Analyst	John Holst		Intersection	South Main & Marlington			
Agency/Co.	Anderson & Associates		Jurisdiction	Town of Blacksburg			
Date Performed	04-04-2007		Analysis Year	2007 Projected			
Analysis Time Period	Midday Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	Marlington Street		North/South Street:	South Main Street			
Intersection Orientation:	North-South		Study Period (hrs):	0.25			
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	
		L	T	R	L	T	
Volume (veh/h)		18	743	42	60	702	
Peak-Hour Factor, PHF		0.80	0.92	0.80	0.80	0.96	
Hourly Flow Rate, HFR (veh/h)		0	0	0	47	0	
Percent Heavy Vehicles		2	--	--	2	--	
Median Type	Raised curb						
RT Channelized				0		0	
Lanes		1	2	0	1	2	
Configuration		L	T	TR	L	T	
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	
		L	T	R	L	T	
Volume (veh/h)					38	48	
Peak-Hour Factor, PHF		1.00	1.00	1.00	0.80	1.00	
Hourly Flow Rate, HFR (veh/h)		74	731	0	22	807	
Percent Heavy Vehicles		0	0	0	2	0	
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0		0	
Lanes		0	0	0	0	0	
Configuration						LR	
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L		LR		
v (veh/h)		22	74		105		
C (m) (veh/h)		867	778		348		
v/c		0.03	0.10		0.30		
95% queue length		0.08	0.31		1.25		
Control Delay (s/veh)		9.3	10.1		19.8		
LOS		A	B		C		
Approach Delay (s/veh)		--	--		19.8		
Approach LOS		--	--		C		

TWO-WAY STOP CONTROL SUMMARY							
General Information			Site Information				
Analyst	John Holst		Intersection	South Main & Marlington			
Agency/Co.	Anderson & Associates		Jurisdiction	Town of Blacksburg			
Date Performed	04-04-2007		Analysis Year	2007 Projected			
Analysis Time Period	PM Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	Marlington Street		North/South Street:	South Main Street			
Intersection Orientation:	North-South		Study Period (hrs):	0.25			
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	
		L	T	R	L	T	
Volume (veh/h)		27	802	77	104	810	
Peak-Hour Factor, PHF		0.93	0.86	0.80	0.80	0.90	
Hourly Flow Rate, HFR (veh/h)		0	0	0	49	0	
Percent Heavy Vehicles		2	--	--	2	--	
Median Type	Raised curb						
RT Channelized				0		0	
Lanes		1	2	0	1	2	
Configuration		L	T	TR	L	T	
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	
		L	T	R	L	T	
Volume (veh/h)					40	53	
Peak-Hour Factor, PHF		1.00	1.00	1.00	0.80	1.00	
Hourly Flow Rate, HFR (veh/h)		129	900	0	29	932	
Percent Heavy Vehicles		0	0	0	2	0	
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0		0	
Lanes		0	0	0	0	0	
Configuration						LR	
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L		LR		
v (veh/h)		29	129		115		
C (m) (veh/h)		738	671		273		
v/c		0.04	0.19		0.42		
95% queue length		0.12	0.71		1.98		
Control Delay (s/veh)		10.1	11.6		27.5		
LOS		B	B		D		
Approach Delay (s/veh)		--	--		27.5		
Approach LOS		--	--		D		

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	John Holst		Intersection	South Main & King		Jurisdiction	Town of Blacksburg
Agency/Co.	Anderson & Associates		Analysis Year	2007 Projected			
Date Performed	04-04-2007						
Analysis Time Period	Midday Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	King Street		North/South Street:	South Main Street			
Intersection Orientation:	North-South		Study Period (hrs):	0.25			
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	6
		L	T	R	L	T	R
Volume (veh/h)		14	1090	61	51	1070	3
Peak-Hour Factor, PHF		0.80	0.93	0.81	0.80	0.83	0.80
Hourly Flow Rate, HFR (veh/h)		29	0	23	46	1	84
Percent Heavy Vehicles		2	--	--	2	--	--
Median Type	Raised curb						
RT Channelized				0			0
Lanes		1	2	0	1	2	0
Configuration		L	T	TR	L	T	TR
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	12
		L	T	R	L	T	R
Volume (veh/h)		25	0	19	43	1	68
Peak-Hour Factor, PHF		0.86	1.00	0.80	0.93	0.80	0.80
Hourly Flow Rate, HFR (veh/h)		63	1289	3	17	1172	75
Percent Heavy Vehicles		2	2	2	2	2	2
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0			0
Lanes		0	1	0	1	1	0
Configuration			LTR		L		TR
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L	L		TR	LTR
v (veh/h)		17	63	46		85	52
C (m) (veh/h)		532	554	112		411	136
v/c		0.03	0.11	0.41		0.21	0.38
95% queue length		0.10	0.38	1.73		0.77	1.61
Control Delay (s/veh)		12.0	12.3	57.9		16.0	47.0
LOS		B	B	F		C	E
Approach Delay (s/veh)		--	--		30.7		47.0
Approach LOS		--	--		D		E

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	John Holst			Intersection	South Main & King		
Agency/Co.	Anderson & Associates			Jurisdiction	Town of Blacksburg		
Date Performed	04-04-2007			Analysis Year	2007 Projected		
Analysis Time Period	PM Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	King Street			North/South Street:	South Main Street		
Intersection Orientation:	North-South			Study Period (hrs):	0.25		
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	6
		L	T	R	L	T	R
Volume (veh/h)		15	1086	71	50	1068	4
Peak-Hour Factor, PHF		0.80	0.92	0.81	0.80	0.84	0.80
Hourly Flow Rate, HFR (veh/h)		29	1	24	37	1	63
Percent Heavy Vehicles		7	--	--	2	--	--
Median Type	Raised curb						
RT Channelized				0			0
Lanes		1	2	0	1	2	0
Configuration		L	T	TR	L	T	TR
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	12
		L	T	R	L	T	R
Volume (veh/h)		26	1	20	32	1	51
Peak-Hour Factor, PHF		0.89	0.80	0.80	0.86	0.80	0.80
Hourly Flow Rate, HFR (veh/h)		62	1271	4	18	1180	87
Percent Heavy Vehicles		4	2	5	2	2	2
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0			0
Lanes		0	1	0	1	1	0
Configuration			LTR		L		TR
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L	L	TR		LTR
v (veh/h)		18	62	37		64	54
C (m) (veh/h)		505	544	110		399	136
v/c		0.04	0.11	0.34		0.16	0.40
95% queue length		0.11	0.38	1.33		0.57	1.70
Control Delay (s/veh)		12.4	12.5	53.5		15.7	47.9
LOS		B	B	F		C	E
Approach Delay (s/veh)		--	--		29.6		47.9
Approach LOS		--	--		D		E

ALL-WAY STOP CONTROL ANALYSIS											
General Information				Site Information							
Analyst	John Holst		Intersection		Country Club & Airport						
Agency/Co.	Anderson & Associates		Jurisdiction		Town of Blacksburg						
Date Performed	04-06-2007		Analysis Year		2008 Background						
Analysis Time Period	Midday Peak										
Project ID	First & Main, Blacksburg										
East/West Street:	Country Club Drive		North/South Street:		Airport Road						
Volume Adjustments and Site Characteristics											
Approach	Eastbound			Westbound							
Movement	L	T	R	L	T	R					
Volume (veh/h)	13	12	12	25	6	190					
%Thrus Left Lane											
Approach	Northbound			Southbound							
Movement	L	T	R	L	T	R					
Volume (veh/h)	4	123	21	180	157	9					
%Thrus Left Lane											
		Eastbound		Westbound		Northbound					
		L1	L2	L1	L2	L1	L2				
Configuration	LTR		LTR		LTR		LTR				
PHF	0.80		0.86		0.86		0.80				
Flow Rate (veh/h)	44		255		171		431				
% Heavy Vehicles	3		2		2		2				
No. Lanes	1		1		1		1				
Geometry Group	1		1		1		1				
Duration, T	0.25										
Saturation Headway Adjustment Worksheet											
Prop. Left-Turns	0.4		0.1		0.0		0.5				
Prop. Right-Turns	0.3		0.9		0.1		0.0				
Prop. Heavy Vehicle	0.0		0.0		0.0		0.0				
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2				
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6				
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7				
hadj, computed	-0.1		-0.5		-0.0		0.1				
Departure Headway and Service Time											
hd, initial value (s)	3.20		3.20		3.20		3.20				
x, initial	0.04		0.23		0.15		0.38				
hd, final value (s)	5.90		5.10		5.32		5.11				
x, final value	0.07		0.36		0.25		0.61				
Move-up time, m (s)	2.0		2.0		2.0		2.0				
Service Time, t _s (s)	3.9		3.1		3.3		3.1				
Capacity and Level of Service											
		Eastbound		Westbound		Northbound					
		L1	L2	L1	L2	L1	L2				
Capacity (veh/h)	294		505		421		681				
Delay (s/veh)	9.36		10.96		10.10		15.82				
LOS	A		B		B		C				
Approach: Delay (s/veh)	9.36		10.96		10.10		15.82				
LOS	A		B		B		C				
Intersection Delay (s/veh)	13.05										
Intersection LOS	B										

ALL-WAY STOP CONTROL ANALYSIS											
General Information				Site Information							
Analyst	John Holst		Intersection		Country Club & Airport						
Agency/Co.	Anderson & Associates		Jurisdiction		Town of Blacksburg						
Date Performed	04-06-2007		Analysis Year		2008 Background						
Analysis Time Period	PM Peak										
Project ID	First & Main, Blacksburg										
East/West Street:	Country Club Drive		North/South Street:		Airport Road						
Volume Adjustments and Site Characteristics											
Approach	Eastbound			Westbound							
Movement	L	T	R	L	T	R					
Volume (veh/h)	13	12	12	25	6	190					
%Thrus Left Lane											
Approach	Northbound			Southbound							
Movement	L	T	R	L	T	R					
Volume (veh/h)	4	123	21	180	157	9					
%Thrus Left Lane											
		Eastbound		Westbound		Northbound					
		L1	L2	L1	L2	L1	L2				
Configuration	LTR		LTR		LTR		LTR				
PHF	0.80		0.86		0.86		0.80				
Flow Rate (veh/h)	44		255		171		431				
% Heavy Vehicles	3		2		2		2				
No. Lanes	1		1		1		1				
Geometry Group	1		1		1		1				
Duration, T	0.25										
Saturation Headway Adjustment Worksheet											
Prop. Left-Turns	0.4		0.1		0.0		0.5				
Prop. Right-Turns	0.3		0.9		0.1		0.0				
Prop. Heavy Vehicle	0.0		0.0		0.0		0.0				
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2				
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6				
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7				
hadj, computed	-0.1		-0.5		-0.0		0.1				
Departure Headway and Service Time											
hd, initial value (s)	3.20		3.20		3.20		3.20				
x, initial	0.04		0.23		0.15		0.38				
hd, final value (s)	5.90		5.10		5.32		5.11				
x, final value	0.07		0.36		0.25		0.61				
Move-up time, m (s)	2.0		2.0		2.0		2.0				
Service Time, t _s (s)	3.9		3.1		3.3		3.1				
Capacity and Level of Service											
		Eastbound		Westbound		Northbound					
		L1	L2	L1	L2	L1	L2				
Capacity (veh/h)	294		505		421		681				
Delay (s/veh)	9.36		10.96		10.10		15.82				
LOS	A		B		B		C				
Approach: Delay (s/veh)	9.36		10.96		10.10		15.82				
LOS	A		B		B		C				
Intersection Delay (s/veh)					13.05						
Intersection LOS					B						

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	John Holst		Intersection	South Main & Ardmore			
Agency/Co.	Anderson & Associates		Jurisdiction	Town of Blacksburg			
Date Performed	04-06-2007		Analysis Year	2008 Background			
Analysis Time Period	Midday Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	Ardmore Street		North/South Street:	South Main Street			
Intersection Orientation:	North-South		Study Period (hrs):	0.25			
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	6
		L	T	R	L	T	R
Volume (veh/h)		12	947	19	27	917	
Peak-Hour Factor, PHF		0.92	0.89	0.90	0.80	0.94	1.00
Hourly Flow Rate, HFR (veh/h)		0	0	0	11	0	46
Percent Heavy Vehicles		2	--	--	2	--	--
Median Type	Raised curb						
RT Channelized				0			0
Lanes		1	2	0	1	2	0
Configuration		L	T	TR	L	T	
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	12
		L	T	R	L	T	R
Volume (veh/h)					9		37
Peak-Hour Factor, PHF		1.00	1.00	1.00	0.80	1.00	0.80
Hourly Flow Rate, HFR (veh/h)		33	975	0	13	1064	21
Percent Heavy Vehicles		0	0	0	2	2	2
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0			0
Lanes		0	0	0	0	0	0
Configuration						LR	
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L		LR		
v (veh/h)		13	33		57		
C (m) (veh/h)		699	635		375		
v/c		0.02	0.05		0.15		
95% queue length		0.06	0.16		0.53		
Control Delay (s/veh)		10.2	11.0		16.3		
LOS		B	B		C		
Approach Delay (s/veh)		--	--		16.3		
Approach LOS		--	--		C		

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	John Holst		Intersection	South Main & Ardmore			
Agency/Co.	Anderson & Associates		Jurisdiction	Town of Blacksburg			
Date Performed	04-04-2007		Analysis Year	2008 Background			
Analysis Time Period	PM Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	Ardmore Street		North/South Street:	South Main Street			
Intersection Orientation:	North-South		Study Period (hrs):	0.25			
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	6
		L	T	R	L	T	R
Volume (veh/h)		21	1065	28	34	983	
Peak-Hour Factor, PHF		0.83	0.86	0.81	0.80	0.89	1.00
Hourly Flow Rate, HFR (veh/h)		0	0	0	17	0	42
Percent Heavy Vehicles		2	--	--	2	--	--
Median Type	Raised curb						
RT Channelized				0			0
Lanes		1	2	0	1	2	0
Configuration		L	T	TR	L	T	
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	12
		L	T	R	L	T	R
Volume (veh/h)					15		34
Peak-Hour Factor, PHF		1.00	1.00	1.00	0.88	1.00	0.80
Hourly Flow Rate, HFR (veh/h)		42	1104	0	25	1238	34
Percent Heavy Vehicles		0	0	0	2	2	2
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0			0
Lanes		0	0	0	0	0	0
Configuration						LR	
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L		LR		
v (veh/h)		25	42		59		
C (m) (veh/h)		618	542		273		
v/c		0.04	0.08		0.22		
95% queue length		0.13	0.25		0.80		
Control Delay (s/veh)		11.1	12.2		21.8		
LOS		B	B		C		
Approach Delay (s/veh)		--	--		21.8		
Approach LOS		--	--		C		

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	John Holst			Intersection	South Main & Landsdowne		
Agency/Co.	Anderson & Associates			Jurisdiction	Town of Blacksburg		
Date Performed	04-04-2007			Analysis Year	2008 Background		
Analysis Time Period	Midday Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	Landsdowne Street			North/South Street:	South Main Street		
Intersection Orientation:	North-South			Study Period (hrs):	0.25		
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	6
		L	T	R	L	T	R
Volume (veh/h)		11	996	14	34	950	0
Peak-Hour Factor, PHF		0.83	0.87	0.80	0.80	0.96	1.00
Hourly Flow Rate, HFR (veh/h)		1	0	3	21	0	37
Percent Heavy Vehicles		2	--	--	3	--	--
Median Type	Raised curb						
RT Channelized				0			0
Lanes		1	2	0	1	2	0
Configuration		L	T	TR	L	T	TR
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	12
		L	T	R	L	T	R
Volume (veh/h)		1	0	3	17	0	30
Peak-Hour Factor, PHF		0.80	1.00	0.80	0.80	1.00	0.80
Hourly Flow Rate, HFR (veh/h)		42	989	0	13	1144	17
Percent Heavy Vehicles		2	2	2	6	2	4
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0			0
Lanes		0	1	0	0	1	0
Configuration			LTR			LTR	
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L		LTR		LTR
v (veh/h)		13	42		58		4
C (m) (veh/h)		695	592		248		320
v/c		0.02	0.07		0.23		0.01
95% queue length		0.06	0.23		0.88		0.04
Control Delay (s/veh)		10.3	11.5		23.9		16.4
LOS		B	B		C		C
Approach Delay (s/veh)		--	--		23.9		16.4
Approach LOS		--	--		C		C

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	John Holst			Intersection	South Main & Landsdowne		
Agency/Co.	Anderson & Associates			Jurisdiction	Town of Blacksburg		
Date Performed	04-04-2007			Analysis Year	2008 Background		
Analysis Time Period	PM Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	Landsdowne Street			North/South Street:	South Main Street		
Intersection Orientation:	North-South			Study Period (hrs):	0.25		
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	6
		L	T	R	L	T	R
Volume (veh/h)		11	774	19	55	791	2
Peak-Hour Factor, PHF		0.80	0.92	0.80	0.85	0.80	0.80
Hourly Flow Rate, HFR (veh/h)		1	0	1	19	0	43
Percent Heavy Vehicles		2	--	--	2	--	--
Median Type	Raised curb						
RT Channelized				0			0
Lanes		1	2	0	1	2	0
Configuration		L	T	TR	L	T	TR
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	12
		L	T	R	L	T	R
Volume (veh/h)		1	0	1	16	0	35
Peak-Hour Factor, PHF		0.80	1.00	0.80	0.80	1.00	0.80
Hourly Flow Rate, HFR (veh/h)		64	988	2	13	841	23
Percent Heavy Vehicles		2	2	2	2	2	6
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0			0
Lanes		0	1	0	0	1	0
Configuration			LTR			LTR	
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L		LTR		LTR
v (veh/h)		13	64		62		2
C (m) (veh/h)		684	766		347		229
v/c		0.02	0.08		0.18		0.01
95% queue length		0.06	0.27		0.64		0.03
Control Delay (s/veh)		10.4	10.1		17.6		20.9
LOS		B	B		C		C
Approach Delay (s/veh)		--	--		17.6		20.9
Approach LOS		--	--		C		C

TWO-WAY STOP CONTROL SUMMARY							
General Information			Site Information				
Analyst	John Holst		Intersection	South Main & Marlington			
Agency/Co.	Anderson & Associates		Jurisdiction	Town of Blacksburg			
Date Performed	04-04-2007		Analysis Year	2008 Background			
Analysis Time Period	Midday Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	Marlington Street		North/South Street:	South Main Street			
Intersection Orientation:	North-South		Study Period (hrs):	0.25			
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	
		L	T	R	L	T	
Volume (veh/h)		18	758	43	61	716	
Peak-Hour Factor, PHF		0.80	0.92	0.80	0.80	0.96	
Hourly Flow Rate, HFR (veh/h)		0	0	0	48	0	
Percent Heavy Vehicles		2	--	--	2	--	
Median Type	Raised curb						
RT Channelized				0		0	
Lanes		1	2	0	1	2	
Configuration		L	T	TR	L	T	
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	
		L	T	R	L	T	
Volume (veh/h)					39	49	
Peak-Hour Factor, PHF		1.00	1.00	1.00	0.80	1.00	
Hourly Flow Rate, HFR (veh/h)		76	745	0	22	823	
Percent Heavy Vehicles		0	0	0	2	0	
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0		0	
Lanes		0	0	0	0	0	
Configuration						LR	
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L		LR		
v (veh/h)		22	76		107		
C (m) (veh/h)		857	766		342		
v/c		0.03	0.10		0.31		
95% queue length		0.08	0.33		1.31		
Control Delay (s/veh)		9.3	10.2		20.2		
LOS		A	B		C		
Approach Delay (s/veh)		--	--		20.2		
Approach LOS		--	--		C		

TWO-WAY STOP CONTROL SUMMARY							
General Information			Site Information				
Analyst	John Holst		Intersection	South Main & Marlington			
Agency/Co.	Anderson & Associates		Jurisdiction	Town of Blacksburg			
Date Performed	04-04-2007		Analysis Year	2008 Background			
Analysis Time Period	PM Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	Marlington Street		North/South Street:	South Main Street			
Intersection Orientation:	North-South		Study Period (hrs):	0.25			
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	
		L	T	R	L	T	
Volume (veh/h)		28	817	78	106	825	
Peak-Hour Factor, PHF		0.93	0.86	0.80	0.80	0.90	
Hourly Flow Rate, HFR (veh/h)		0	0	0	51	0	
Percent Heavy Vehicles		2	--	--	2	--	
Median Type	Raised curb						
RT Channelized				0		0	
Lanes		1	2	0	1	2	
Configuration		L	T	TR	L	T	
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	
		L	T	R	L	T	
Volume (veh/h)					41	54	
Peak-Hour Factor, PHF		1.00	1.00	1.00	0.80	1.00	
Hourly Flow Rate, HFR (veh/h)		132	916	0	30	949	
Percent Heavy Vehicles		0	0	0	2	0	
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0		0	
Lanes		0	0	0	0	0	
Configuration						LR	
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L		LR		
v (veh/h)		30	132		118		
C (m) (veh/h)		728	661		263		
v/c		0.04	0.20		0.45		
95% queue length		0.13	0.74		2.18		
Control Delay (s/veh)		10.2	11.8		29.4		
LOS		B	B		D		
Approach Delay (s/veh)		--	--		29.4		
Approach LOS		--	--		D		

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	John Holst		Intersection	South Main & King		Jurisdiction	Town of Blacksburg
Agency/Co.	Anderson & Associates		Analysis Year	2008 Background			
Date Performed	04-04-2007						
Analysis Time Period	Midday Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	King Street		North/South Street:	South Main Street			
Intersection Orientation:	North-South		Study Period (hrs):	0.25			
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	6
		L	T	R	L	T	R
Volume (veh/h)		14	1111	62	52	1090	3
Peak-Hour Factor, PHF		0.80	0.93	0.81	0.80	0.83	0.80
Hourly Flow Rate, HFR (veh/h)		30	0	23	47	1	87
Percent Heavy Vehicles		2	--	--	2	--	--
Median Type	Raised curb						
RT Channelized				0			0
Lanes		1	2	0	1	2	0
Configuration		L	T	TR	L	T	TR
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	12
		L	T	R	L	T	R
Volume (veh/h)		26	0	19	44	1	70
Peak-Hour Factor, PHF		0.86	1.00	0.80	0.93	0.80	0.80
Hourly Flow Rate, HFR (veh/h)		64	1313	3	17	1194	76
Percent Heavy Vehicles		2	2	2	2	2	2
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0			0
Lanes		0	1	0	1	1	0
Configuration			LTR		L		TR
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L	L	TR		LTR
v (veh/h)		17	64	47		88	53
C (m) (veh/h)		521	543	109		405	129
v/c		0.03	0.12	0.43		0.22	0.41
95% queue length		0.10	0.40	1.84		0.82	1.76
Control Delay (s/veh)		12.1	12.5	61.0		16.3	51.1
LOS		B	B	F		C	F
Approach Delay (s/veh)		--	--		31.9		51.1
Approach LOS		--	--		D		F

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	John Holst			Intersection	South Main & King		
Agency/Co.	Anderson & Associates			Jurisdiction	Town of Blacksburg		
Date Performed	04-04-2007			Analysis Year	2008 Background		
Analysis Time Period	PM Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	King Street			North/South Street:	South Main Street		
Intersection Orientation:	North-South			Study Period (hrs):	0.25		
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	6
		L	T	R	L	T	R
Volume (veh/h)		15	1106	73	51	1088	4
Peak-Hour Factor, PHF		0.80	0.92	0.81	0.80	0.84	0.80
Hourly Flow Rate, HFR (veh/h)		30	1	24	37	1	64
Percent Heavy Vehicles		7	--	--	2	--	--
Median Type	Raised curb						
RT Channelized				0			0
Lanes		1	2	0	1	2	0
Configuration		L	T	TR	L	T	TR
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	12
		L	T	R	L	T	R
Volume (veh/h)		27	1	20	32	1	52
Peak-Hour Factor, PHF		0.89	0.80	0.80	0.86	0.80	0.80
Hourly Flow Rate, HFR (veh/h)		63	1295	4	18	1202	90
Percent Heavy Vehicles		4	2	5	2	2	2
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0			0
Lanes		0	1	0	1	1	0
Configuration			LTR		L		TR
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L	L	TR		LTR
v (veh/h)		18	63	37		65	55
C (m) (veh/h)		495	532	107		391	129
v/c		0.04	0.12	0.35		0.17	0.43
95% queue length		0.11	0.40	1.37		0.59	1.86
Control Delay (s/veh)		12.5	12.7	55.5		16.0	52.2
LOS		B	B	F		C	F
Approach Delay (s/veh)		--	--		30.3		52.2
Approach LOS		--	--		D		F

ALL-WAY STOP CONTROL ANALYSIS											
General Information				Site Information							
Analyst	John Holst		Intersection		Country Club & Airport						
Agency/Co.	Anderson & Associates		Jurisdiction		Town of Blacksburg						
Date Performed	04-06-2007		Analysis Year		2008 Buildout						
Analysis Time Period	Midday Peak										
Project ID	First & Main, Blacksburg										
East/West Street:	Country Club Drive		North/South Street:		Airport Road						
Volume Adjustments and Site Characteristics											
Approach	Eastbound			Westbound							
Movement	L	T	R	L	T	R					
Volume (veh/h)	13	15	12	28	10	219					
%Thrus Left Lane											
Approach	Northbound			Southbound							
Movement	L	T	R	L	T	R					
Volume (veh/h)	4	123	27	209	157	9					
%Thrus Left Lane											
		Eastbound		Westbound		Northbound					
		L1	L2	L1	L2	L1	L2				
Configuration	LTR		LTR		LTR		LTR				
PHF	0.85		0.87		0.87		0.85				
Flow Rate (veh/h)	46		294		176		439				
% Heavy Vehicles	3		2		2		2				
No. Lanes	1		1		1		1				
Geometry Group	1		1		1		1				
Duration, T	0.25										
Saturation Headway Adjustment Worksheet											
Prop. Left-Turns	0.3		0.1		0.0		0.6				
Prop. Right-Turns	0.3		0.9		0.2		0.0				
Prop. Heavy Vehicle	0.0		0.0		0.0		0.0				
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2				
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6				
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7				
hadj, computed	-0.1		-0.5		-0.1		0.1				
Departure Headway and Service Time											
hd, initial value (s)	3.20		3.20		3.20		3.20				
x, initial	0.04		0.26		0.16		0.39				
hd, final value (s)	6.08		5.20		5.48		5.27				
x, final value	0.08		0.42		0.27		0.64				
Move-up time, m (s)	2.0		2.0		2.0		2.0				
Service Time, t _s (s)	4.1		3.2		3.5		3.3				
Capacity and Level of Service											
		Eastbound		Westbound		Northbound					
		L1	L2	L1	L2	L1	L2				
Capacity (veh/h)	296		544		426		662				
Delay (s/veh)	9.59		11.97		10.47		17.27				
LOS	A		B		B		C				
Approach: Delay (s/veh)	9.59		11.97		10.47		17.27				
LOS	A		B		B		C				
Intersection Delay (s/veh)				14.02							
Intersection LOS				B							

Phone:
E-Mail:

Fax:

ALL-WAY STOP CONTROL(AWSC) ANALYSIS

Analyst: John Holst
 Agency/Co.: Anderson & Associates
 Date Performed: 04-06-2007
 Analysis Time Period: PM Peak
 Intersection: Country Club & Airport
 Jurisdiction: Town of Blacksburg
 Units: U. S. Customary
 Analysis Year: 2008 Buildout
 Project ID: First & Main, Blacksburg
 East/West Street: Country Club Drive
 North/South Street: Airport Road

Worksheet 2 - Volume Adjustments and Site Characteristics

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	13	16	12	29	11	224	4	123	26	217	157	9
% Thrus Left Lane												

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.85		0.87		0.87		0.85	
Flow Rate	47		302		174		449	
% Heavy Veh	3		2		2		2	
No. Lanes	1		1		1		1	
Opposing-Lanes	1		1		1		1	
Conflicting-lanes	1		1		1		1	
Geometry group	1		1		1		1	
Duration, T	0.25	hrs.						

Worksheet 3 - Saturation Headway Adjustment Worksheet

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow Rates:								
Total in Lane	47		302		174		449	
Left-Turn	15		33		4		255	
Right-Turn	14		257		29		10	
Prop. Left-Turns	0.3		0.1		0.0		0.6	
Prop. Right-Turns	0.3		0.9		0.2		0.0	
Prop. Heavy Vehicle	0.0		0.0		0.0		0.0	
Geometry Group	1		1		1		1	
Adjustments Exhibit 17-33:								
hLT-adj	0.2		0.2		0.2		0.2	

hRT-adj	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7
hadj, computed	-0.1	-0.5	-0.1	0.1

Worksheet 4 - Departure Headway and Service Time

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow rate	47		302		174		449	
hd, initial value	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
x, initial	0.04		0.27		0.15		0.40	
hd, final value	6.14		5.24		5.55		5.31	
x, final value	0.08		0.44		0.27		0.66	
Move-up time, m		2.0		2.0		2.0		2.0
Service Time	4.1		3.2		3.5		3.3	

Worksheet 5 - Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow Rate	47		302		174		449	
Service Time	4.1		3.2		3.5		3.3	
Utilization, x	0.08		0.44		0.27		0.66	
Dep. headway, hd	6.14		5.24		5.55		5.31	
Capacity	297		552		424		658	
Delay	9.68		12.28		10.56		18.10	
LOS	A		B		B		C	
Approach:								
Delay		9.68		12.28		10.56		18.10
LOS		A		B		B		C
Intersection Delay	14.53				Intersection LOS	B		

TWO-WAY STOP CONTROL SUMMARY							
General Information			Site Information				
Analyst	John Holst		Intersection	South Main & Ardmore			
Agency/Co.	Anderson & Associates		Jurisdiction	Town of Blacksburg			
Date Performed	04-06-2007		Analysis Year	2008 Bauild			
Analysis Time Period	Midday Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	Ardmore Street		North/South Street:	South Main Street			
Intersection Orientation:	North-South		Study Period (hrs):	0.25			
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	
		L	T	R	L	T	
Volume (veh/h)		142	1109	19	27	1096	
Peak-Hour Factor, PHF		0.92	0.89	0.90	0.88	0.94	
Hourly Flow Rate, HFR (veh/h)		180	15	62	10	16	
Percent Heavy Vehicles		2	--	--	2	--	
Median Type	Raised curb						
RT Channelized				0		0	
Lanes		1	2	0	1	2	
Configuration		L	T	TR	L	T	
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	
		L	T	R	L	T	
Volume (veh/h)		162	14	56	9	14	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.85	0.85	
Hourly Flow Rate, HFR (veh/h)		30	1165	76	154	1246	
Percent Heavy Vehicles		2	2	2	2	2	
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0		0	
Lanes		1	1	0	0	1	
Configuration		L		TR		LTR	
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L		LTR		L
v (veh/h)		154	30		69		180
C (m) (veh/h)		554	542		104		74
v/c		0.28	0.06		0.66		2.43
95% queue length		1.13	0.18		3.35		17.18
Control Delay (s/veh)		14.0	12.0		90.7		772.3
LOS		B	B		F		D
Approach Delay (s/veh)		--	--		90.7		550.6
Approach LOS		--	--		F		F

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	John Holst			Intersection	South Main & Ardmore		
Agency/Co.	Anderson & Associates			Jurisdiction	Town of Blacksburg		
Date Performed	04-04-2007			Analysis Year	2008 Buildout		
Analysis Time Period	PM Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	Ardmore Street			North/South Street:	South Main Street		
Intersection Orientation:	North-South			Study Period (hrs):	0.25		
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	6
		L	T	R	L	T	R
Volume (veh/h)		188	1258	28	34	1206	92
Peak-Hour Factor, PHF		0.88	0.88	0.88	0.88	0.89	0.88
Hourly Flow Rate, HFR (veh/h)		215	18	74	17	21	39
Percent Heavy Vehicles		2	--	--	2	--	--
Median Type	Raised curb						
RT Channelized				0			0
Lanes		1	2	0	1	2	1
Configuration		L	T	TR	L	T	R
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	12
		L	T	R	L	T	R
Volume (veh/h)		194	17	67	15	18	34
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.88	0.85	0.85
Hourly Flow Rate, HFR (veh/h)		38	1355	104	213	1429	31
Percent Heavy Vehicles		2	2	2	2	2	2
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0			0
Lanes		1	1	0	0	1	0
Configuration		L		TR		LTR	
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L		LTR		L
v (veh/h)		213	38		77		215
C (m) (veh/h)		453	459		0		88
v/c		0.47	0.08				1.05
95% queue length		2.46	0.27				6.13
Control Delay (s/veh)		19.8	13.5				195.2
LOS		C	B		F		F
Approach Delay (s/veh)		--	--				
Approach LOS		--	--				

TWO-WAY STOP CONTROL SUMMARY							
General Information			Site Information				
Analyst	John Holst		Intersection	South Main & Landsdowne			
Agency/Co.	Anderson & Associates		Jurisdiction	Town of Blacksburg			
Date Performed	04-06-2007		Analysis Year	2008 Buildout			
Analysis Time Period	Midday Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	Landsdowne Street		North/South Street:	South Main Street			
Intersection Orientation:	North-South		Study Period (hrs):	0.25			
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	
		L	T	R	L	T	
Volume (veh/h)		11	1289	14	34	1186	
Peak-Hour Factor, PHF		0.88	0.88	0.88	0.88	0.96	
Hourly Flow Rate, HFR (veh/h)		0	0	0	19	0	
Percent Heavy Vehicles		2	--	--	3	--	
Median Type	Raised curb						
RT Channelized				0		0	
Lanes		1	2	0	1	2	
Configuration		L	T	TR	L	T	
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	
		L	T	R	L	T	
Volume (veh/h)					17	30	
Peak-Hour Factor, PHF		1.00	1.00	1.00	0.85	1.00	
Hourly Flow Rate, HFR (veh/h)		38	1235	0	12	1464	
Percent Heavy Vehicles		2	2	2	6	2	
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0		0	
Lanes		0	0	0	0	0	
Configuration						LR	
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L		LR		
v (veh/h)		12	38		54		
C (m) (veh/h)		560	446		207		
v/c		0.02	0.09		0.26		
95% queue length		0.07	0.28		1.01		
Control Delay (s/veh)		11.6	13.8		28.4		
LOS		B	B		D		
Approach Delay (s/veh)		--	--		28.4		
Approach LOS		--	--		D		

TWO-WAY STOP CONTROL SUMMARY							
General Information			Site Information				
Analyst	John Holst		Intersection	South Main & Landsdowne			
Agency/Co.	Anderson & Associates		Jurisdiction	Town of Blacksburg			
Date Performed	04-06-2007		Analysis Year	2008 Buildout			
Analysis Time Period	PM Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	Landsdowne Street		North/South Street:	South Main Street			
Intersection Orientation:	North-South		Study Period (hrs):	0.25			
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	
		L	T	R	L	T	
Volume (veh/h)		11	1134	19	55	1081	
Peak-Hour Factor, PHF		0.88	0.92	0.88	0.88	0.92	
Hourly Flow Rate, HFR (veh/h)		0	0	0	18	0	
Percent Heavy Vehicles		2	--	--	2	--	
Median Type	Raised curb						
RT Channelized				0		0	
Lanes		1	2	0	1	2	
Configuration		L	T	TR	L	T	
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	
		L	T	R	L	T	
Volume (veh/h)					16	35	
Peak-Hour Factor, PHF		1.00	1.00	1.00	0.85	1.00	
Hourly Flow Rate, HFR (veh/h)		62	1174	0	12	1232	
Percent Heavy Vehicles		2	2	2	2	6	
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0		0	
Lanes		0	0	0	0	0	
Configuration						LR	
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L		LR		
v (veh/h)		12	62		59		
C (m) (veh/h)		582	545		267		
v/c		0.02	0.11		0.22		
95% queue length		0.06	0.38		0.82		
Control Delay (s/veh)		11.3	12.5		22.3		
LOS		B	B		C		
Approach Delay (s/veh)		--	--		22.3		
Approach LOS		--	--		C		

TWO-WAY STOP CONTROL SUMMARY							
General Information			Site Information				
Analyst	John Holst		Intersection	South Main & Marlington			
Agency/Co.	Anderson & Associates		Jurisdiction	Town of Blacksburg			
Date Performed	04-04-2007		Analysis Year	2008 Buildout			
Analysis Time Period	PM Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	Marlington Street		North/South Street:	South Main Street			
Intersection Orientation:	North-South		Study Period (hrs):	0.25			
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	
		L	T	R	L	T	
Volume (veh/h)		120	1001	78	106	995	
Peak-Hour Factor, PHF		0.93	0.88	0.88	0.88	0.90	
Hourly Flow Rate, HFR (veh/h)		196	18	93	48	21	
Percent Heavy Vehicles		2	--	--	2	--	
Median Type	Raised curb						
RT Channelized				0		0	
Lanes		1	2	0	1	2	
Configuration		L	T	TR	L	T	
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	
		L	T	R	L	T	
Volume (veh/h)		177	17	84	41	18	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.85	0.85	
Hourly Flow Rate, HFR (veh/h)		120	1105	133	129	1137	
Percent Heavy Vehicles		2	2	2	2	2	
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0		0	
Lanes		1	1	0	0	1	
Configuration		L		TR		LTR	
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L		LTR		L
v (veh/h)		129	120		132		196
C (m) (veh/h)		548	565		45		38
v/c		0.24	0.21		2.93		5.16
95% queue length		0.91	0.80		14.33		22.95
Control Delay (s/veh)		13.6	13.1		1063		2082
LOS		B	B		F		F
Approach Delay (s/veh)		--	--		1063		1400
Approach LOS		--	--		F		F

TWO-WAY STOP CONTROL SUMMARY							
General Information			Site Information				
Analyst	John Holst		Intersection	South Main & Marlington			
Agency/Co.	Anderson & Associates		Jurisdiction	Town of Blacksburg			
Date Performed	04-04-2007		Analysis Year	2008 Buildout			
Analysis Time Period	Midday Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	Marlington Street		North/South Street:	South Main Street			
Intersection Orientation:	North-South		Study Period (hrs):	0.25			
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	
		L	T	R	L	T	
Volume (veh/h)		91	902	43	61	857	
Peak-Hour Factor, PHF		0.88	0.92	0.88	0.88	0.96	
Hourly Flow Rate, HFR (veh/h)		164	15	78	45	16	
Percent Heavy Vehicles		2	--	--	2	--	
Median Type	Raised curb						
RT Channelized				0		0	
Lanes		1	2	0	1	2	
Configuration		L	T	TR	L	T	
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	
		L	T	R	L	T	
Volume (veh/h)		148	14	71	39	14	
Peak-Hour Factor, PHF		0.90	0.90	0.90	0.85	0.85	
Hourly Flow Rate, HFR (veh/h)		69	892	97	103	980	
Percent Heavy Vehicles		2	2	2	2	2	
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0		0	
Lanes		1	1	0	0	1	
Configuration		L		TR		LTR	
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L		LTR		L
v (veh/h)		103	69		118		164
C (m) (veh/h)		693	671		160		113
v/c		0.15	0.10		0.74		1.45
95% queue length		0.52	0.34		4.53		11.65
Control Delay (s/veh)		11.1	11.0		73.1		314.8
LOS		B	B		F		C
Approach Delay (s/veh)		--	--		73.1		208.5
Approach LOS		--	--		F		F

TWO-WAY STOP CONTROL SUMMARY									
General Information				Site Information					
Analyst	John Holst		Intersection	South Main & King					
Agency/Co.	Anderson & Associates		Jurisdiction	Town of Blacksburg					
Date Performed	04-06-2007		Analysis Year	2008 Buildout					
Analysis Time Period	Midday Peak								
Project Description	First & Main, Blacksburg								
East/West Street:	King Street		North/South Street:	South Main Street					
Intersection Orientation:	North-South		Study Period (hrs):	0.25					
Vehicle Volumes and Adjustments									
Major Street		Northbound			Southbound				
Movement		1	2	3	4	5	6		
		L	T	R	L	T	R		
Volume (veh/h)		36	1341	62	52	1288	18		
Peak-Hour Factor, PHF		0.88	0.93	0.88	0.88	0.88	0.88		
Hourly Flow Rate, HFR (veh/h)		13	0	64	47	1	82		
Percent Heavy Vehicles		2	--	--	2	--	--		
Median Type	Raised curb								
RT Channelized				0			0		
Lanes		1	2	0	1	2	0		
Configuration		L	T	TR	L	T	TR		
Upstream Signal			0			0			
Minor Street		Eastbound			Westbound				
Movement		7	8	9	10	11	12		
		L	T	R	L	T	R		
Volume (veh/h)		12	0	55	44	1	70		
Peak-Hour Factor, PHF		0.86	1.00	0.85	0.93	0.85	0.85		
Hourly Flow Rate, HFR (veh/h)		59	1463	20	40	1441	70		
Percent Heavy Vehicles		2	2	2	2	2	2		
Percent Grade (%)			0			0			
Flared Approach			N			N			
Storage			0			0			
RT Channelized				0			0		
Lanes		0	1	0	1	1	0		
Configuration			LTR		L		TR		
Delay, Queue Length, and Level of Service									
Approach		Northbound	Southbound	Westbound		Eastbound			
Movement		1	4	7	8	9	10		
Lane Configuration		L	L	L		TR	LTR		
v (veh/h)		40	59	47		83	77		
C (m) (veh/h)		450	439	68		332	198		
v/c		0.09	0.13	0.69		0.25	0.39		
95% queue length		0.29	0.46	3.09		0.97	1.71		
Control Delay (s/veh)		13.8	14.5	134.4		19.4	34.3		
LOS		B	B	F		C	D		
Approach Delay (s/veh)		--	--		61.0		34.3		
Approach LOS		--	--		F		D		

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	John Holst			Intersection	South Main & King		
Agency/Co.	Anderson & Associates			Jurisdiction	Town of Blacksburg		
Date Performed	04-06-2007			Analysis Year	2008 Buildout		
Analysis Time Period	PM Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	King Street			North/South Street:	South Main Street		
Intersection Orientation:	North-South			Study Period (hrs):	0.25		
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	6
		L	T	R	L	T	R
Volume (veh/h)		43	1396	73	51	1324	23
Peak-Hour Factor, PHF		0.88	0.92	0.88	0.88	0.88	0.88
Hourly Flow Rate, HFR (veh/h)		14	1	72	37	1	61
Percent Heavy Vehicles		4	--	--	2	--	--
Median Type	Raised curb						
RT Channelized				0			0
Lanes		1	2	0	1	2	0
Configuration		L	T	TR	L	T	TR
Upstream Signal			0			0	
Minor Street		Eastbound			Westbound		
Movement		7	8	9	10	11	12
		L	T	R	L	T	R
Volume (veh/h)		13	1	62	32	1	52
Peak-Hour Factor, PHF		0.89	0.85	0.85	0.86	0.85	0.85
Hourly Flow Rate, HFR (veh/h)		57	1504	26	48	1517	82
Percent Heavy Vehicles		4	2	5	2	2	2
Percent Grade (%)			0			0	
Flared Approach			N			N	
Storage			0			0	
RT Channelized				0			0
Lanes		0	1	0	1	1	0
Configuration			LTR		L		TR
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement		1	4	7	8	9	10
Lane Configuration		L	L	L	TR		LTR
v (veh/h)		48	57	37		62	87
C (m) (veh/h)		415	406	57		299	178
v/c		0.12	0.14	0.65		0.21	0.49
95% queue length		0.39	0.48	2.68		0.77	2.37
Control Delay (s/veh)		14.8	15.3	146.3		20.2	43.2
LOS		B	C	F		C	E
Approach Delay (s/veh)		--	--		67.3		43.2
Approach LOS		--	--		F		E

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	John Holst			Intersection	Country Club & Truck Entrance		
Agency/Co.	Anderson & Associates			Jurisdiction	Town of Blacksburg		
Date Performed	04-06-2007			Analysis Year	2008 Buildout		
Analysis Time Period	Midday Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	Truck Entrance			North/South Street:	Country Club Drive		
Intersection Orientation:	East-West			Study Period (hrs):	0.25		
Vehicle Volumes and Adjustments							
Major Street		Eastbound			Westbound		
Movement		1	2	3	4	5	6
		L	T	R	L	T	R
Volume (veh/h)		213		36	65	257	
Peak-Hour Factor, PHF	1.00	0.85	0.85	0.88	0.88	1.00	
Hourly Flow Rate, HFR (veh/h)	0	250		42	73	292	0
Percent Heavy Vehicles	2	--		--	2	--	--
Median Type		Undivided					
RT Channelized				0			0
Lanes	0	1		0	0	1	0
Configuration				TR	LT		
Upstream Signal		0				0	
Minor Street		Northbound			Southbound		
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)		63					
Peak-Hour Factor, PHF	1.00	1.00	0.90	1.00	1.00	1.00	
Hourly Flow Rate, HFR (veh/h)	0	0		70	0	0	0
Percent Heavy Vehicles	2	0		2	2	0	0
Percent Grade (%)		0			0		
Flared Approach		N				N	
Storage		0				0	
RT Channelized				0			0
Lanes	0	0		1	0	0	0
Configuration				R			
Delay, Queue Length, and Level of Service							
Approach		Eastbound	Westbound	Northbound		Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration			LT		R		
v (veh/h)		73			70		
C (m) (veh/h)		1270			768		
v/c		0.06			0.09		
95% queue length		0.18			0.30		
Control Delay (s/veh)		8.0			10.2		
LOS		A			B		
Approach Delay (s/veh)	--	--			10.2		
Approach LOS	--	--			B		

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	John Holst			Intersection	Country Club & Truck Entrance		
Agency/Co.	Anderson & Associates			Jurisdiction	Town of Blacksburg		
Date Performed	04-04-2007			Analysis Year	2008 Buildout		
Analysis Time Period	PM Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	Truck Entrance			North/South Street:	Country Club Drive		
Intersection Orientation:	East-West			Study Period (hrs):	0.25		
Vehicle Volumes and Adjustments							
Major Street		Eastbound			Westbound		
Movement		1	2	3	4	5	6
		L	T	R	L	T	R
Volume (veh/h)		213		49	83	264	
Peak-Hour Factor, PHF	1.00	0.85	0.85	0.89	0.89	1.00	
Hourly Flow Rate, HFR (veh/h)	0	250		57	93	296	0
Percent Heavy Vehicles	2	--		--	2	--	--
Median Type		Undivided					
RT Channelized				0			0
Lanes	0	1		0	0	1	0
Configuration				TR	LT		
Upstream Signal		0				0	
Minor Street		Northbound			Southbound		
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)		76					
Peak-Hour Factor, PHF	1.00	1.00	0.90	1.00	1.00	1.00	
Hourly Flow Rate, HFR (veh/h)	0	0		84	0	0	0
Percent Heavy Vehicles	2	0		2	2	0	0
Percent Grade (%)		0			0		
Flared Approach		N				N	
Storage		0				0	
RT Channelized				0			0
Lanes	0	0		1	0	0	0
Configuration				R			
Delay, Queue Length, and Level of Service							
Approach		Eastbound	Westbound	Northbound		Southbound	
Movement	1	4	7	8	9	10	11
Lane Configuration			LT		R		
v (veh/h)		93			84		
C (m) (veh/h)		1254			761		
v/c		0.07			0.11		
95% queue length		0.24			0.37		
Control Delay (s/veh)		8.1			10.3		
LOS		A			B		
Approach Delay (s/veh)	--	--			10.3		
Approach LOS	--	--			B		

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	John Holst			Intersection	South Main & Right-In Entrance		
Agency/Co.	Anderson & Associates			Jurisdiction	Town of Blacksburg		
Date Performed	04-06-2007			Analysis Year	2008 Buildout		
Analysis Time Period	Midday Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	Right-In Entrance			North/South Street:	South Main Street		
Intersection Orientation:	North-South			Study Period (hrs):	0.25		
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	6
		L	T	R	L	T	R
Volume (veh/h)		1309			1053		
Peak-Hour Factor, PHF	1.00	0.89	1.00	1.00	0.93	0.93	
Hourly Flow Rate, HFR (veh/h)	0	0	78	0	0	0	
Percent Heavy Vehicles	2	--	--	3	--	--	
Median Type	Raised curb						
RT Channelized				0			0
Lanes	0	2	0	0	2	1	
Configuration		T			T	R	
Upstream Signal		0			0		
Minor Street		Eastbound			Westbound		
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)		71					
Peak-Hour Factor, PHF	1.00	1.00	0.90	1.00	1.00	1.00	
Hourly Flow Rate, HFR (veh/h)	0	1132	124	0	1470	0	
Percent Heavy Vehicles	2	2	2	6	2	4	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0				0
Lanes	0	0	1	0	0	0	
Configuration			R				
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement	1	4	7	8	9	10	11
Lane Configuration							R
v (veh/h)							78
C (m) (veh/h)							467
v/c							0.17
95% queue length							0.59
Control Delay (s/veh)							14.2
LOS							B
Approach Delay (s/veh)	--	--					14.2
Approach LOS	--	--					B

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	John Holst			Intersection	South Main & Right-In Entrance		
Agency/Co.	Anderson & Associates			Jurisdiction	Town of Blacksburg		
Date Performed	04-06-2007			Analysis Year	2008 Buildout		
Analysis Time Period	PM Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	Right-In Entrance			North/South Street:	South Main Street		
Intersection Orientation:	North-South			Study Period (hrs):	0.25		
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	6
		L	T	R	L	T	R
Volume (veh/h)		1486			1233		
Peak-Hour Factor, PHF	1.00	0.88	1.00	1.00	0.88	0.88	
Hourly Flow Rate, HFR (veh/h)	0	0	93	0	0	0	
Percent Heavy Vehicles	2	--	--	3	--	--	
Median Type	Raised curb						
RT Channelized				0			0
Lanes	0	2	0	0	2	1	
Configuration		T			T	R	
Upstream Signal		0			0		
Minor Street		Eastbound			Westbound		
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)		84					
Peak-Hour Factor, PHF	1.00	1.00	0.90	1.00	1.00	1.00	
Hourly Flow Rate, HFR (veh/h)	0	1401	168	0	1688	0	
Percent Heavy Vehicles	2	2	2	6	2	4	
Percent Grade (%)		0			0		
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0				0
Lanes	0	0	1	0	0	0	
Configuration			R				
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement	1	4	7	8	9	10	11
Lane Configuration							R
v (veh/h)							93
C (m) (veh/h)							382
v/c							0.24
95% queue length							0.94
Control Delay (s/veh)							17.4
LOS							C
Approach Delay (s/veh)	--	--					17.4
Approach LOS	--	--					C

TWO-WAY STOP CONTROL SUMMARY									
General Information				Site Information					
Analyst	<i>John Holst</i>		Intersection	<i>King & Theater Entrance</i>					
Agency/Co.	<i>Anderson & Associates</i>		Jurisdiction	<i>Town of Blacksburg</i>					
Date Performed	<i>04-06-2007</i>		Analysis Year	<i>2008 Buildout</i>					
Analysis Time Period	<i>Midday Peak</i>								
Project Description	<i>First & Main, Blacksburg</i>								
East/West Street:	<i>King Street</i>		North/South Street:	<i>Theater Entrance</i>					
Intersection Orientation:	<i>East-West</i>		Study Period (hrs):	<i>0.25</i>					
Vehicle Volumes and Adjustments									
Major Street		Eastbound			Westbound				
Movement		1	2	3	4	5	6		
		L	T	R	L	T	R		
Volume (veh/h)		72	5			26	36		
Peak-Hour Factor, PHF		0.87	0.87	1.00	1.00	0.88	0.88		
Hourly Flow Rate, HFR (veh/h)		82	5	0	0	29	40		
Percent Heavy Vehicles		2	--	--	2	--	--		
Median Type		<i>Undivided</i>							
RT Channelized				0			0		
Lanes		0	1	0	0	1	0		
Configuration		<i>LT</i>							
Upstream Signal		<i>0</i>							
Minor Street		Northbound			Southbound				
Movement		7	8	9	10	11	12		
		L	T	R	L	T	R		
Volume (veh/h)					42		63		
Peak-Hour Factor, PHF		1.00	1.00	1.00	0.90	1.00	0.90		
Hourly Flow Rate, HFR (veh/h)		0	0	0	46	0	70		
Percent Heavy Vehicles		2	0	2	2	0	2		
Percent Grade (%)		<i>0</i>							
Flared Approach		<i>N</i>							
Storage		<i>0</i>							
RT Channelized				0			0		
Lanes		0	0	0	0	0	0		
Configuration		<i>LR</i>							
Delay, Queue Length, and Level of Service									
Approach		Eastbound	Westbound	Northbound		Southbound			
Movement		1	4	7	8	9	10		
Lane Configuration		<i>LT</i>					<i>LR</i>		
v (veh/h)		<i>82</i>					<i>116</i>		
C (m) (veh/h)		<i>1532</i>					<i>881</i>		
v/c		<i>0.05</i>					<i>0.13</i>		
95% queue length		<i>0.17</i>					<i>0.45</i>		
Control Delay (s/veh)		<i>7.5</i>					<i>9.7</i>		
LOS		<i>A</i>					<i>A</i>		
Approach Delay (s/veh)		--	--				<i>9.7</i>		
Approach LOS		--	--				<i>A</i>		

TWO-WAY STOP CONTROL SUMMARY									
General Information				Site Information					
Analyst	<i>John Holst</i>		Intersection	<i>King & Theater Entrance</i>					
Agency/Co.	<i>Anderson & Associates</i>		Jurisdiction	<i>Town of Blacksburg</i>					
Date Performed	<i>04-06-2007</i>		Analysis Year	<i>2008 Buildout</i>					
Analysis Time Period	<i>PM Peak</i>								
Project Description	<i>First & Main, Blacksburg</i>								
East/West Street:	<i>King Street</i>		North/South Street:	<i>Theater Entrance</i>					
Intersection Orientation:	<i>East-West</i>		Study Period (hrs):	<i>0.25</i>					
Vehicle Volumes and Adjustments									
Major Street		Eastbound			Westbound				
Movement		1	2	3	4	5	6		
		L	T	R	L	T	R		
Volume (veh/h)		92	5			27	46		
Peak-Hour Factor, PHF		0.87	0.87	1.00	1.00	0.88	0.88		
Hourly Flow Rate, HFR (veh/h)		105	5	0	0	30	52		
Percent Heavy Vehicles		2	--	--	2	--	--		
Median Type		<i>Undivided</i>							
RT Channelized				0			0		
Lanes		0	1	0	0	1	0		
Configuration		<i>LT</i>							
Upstream Signal		<i>0</i>							
Minor Street		Northbound			Southbound				
Movement		7	8	9	10	11	12		
		L	T	R	L	T	R		
Volume (veh/h)					51		76		
Peak-Hour Factor, PHF		1.00	1.00	1.00	0.90	1.00	0.90		
Hourly Flow Rate, HFR (veh/h)		0	0	0	56	0	84		
Percent Heavy Vehicles		2	0	2	2	0	2		
Percent Grade (%)		<i>0</i>							
Flared Approach		<i>N</i>							
Storage		<i>0</i>							
RT Channelized				0			0		
Lanes		0	0	0	0	0	0		
Configuration		<i>LR</i>							
Delay, Queue Length, and Level of Service									
Approach		Eastbound	Westbound	Northbound		Southbound			
Movement		1	4	7	8	9	10		
Lane Configuration		<i>LT</i>					<i>LR</i>		
v (veh/h)		<i>105</i>					<i>140</i>		
C (m) (veh/h)		<i>1515</i>					<i>839</i>		
v/c		<i>0.07</i>					<i>0.17</i>		
95% queue length		<i>0.22</i>					<i>0.60</i>		
Control Delay (s/veh)		<i>7.6</i>					<i>10.1</i>		
LOS		<i>A</i>					<i>B</i>		
Approach Delay (s/veh)		--	--				<i>10.1</i>		
Approach LOS		--	--				<i>B</i>		

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	<i>John Holst</i>		Intersection	<i>King & Hubbard</i>			
Agency/Co.	<i>Anderson & Associates</i>		Jurisdiction	<i>Town of Blacksburg</i>			
Date Performed	<i>04-06-2007</i>		Analysis Year	<i>2008 Buildout</i>			
Analysis Time Period	<i>Midday Peak</i>						
Project Description	<i>First & Main, Blacksburg</i>						
East/West Street:	<i>King Street</i>		North/South Street:	<i>Hubbard Street</i>			
Intersection Orientation:	<i>North-South</i>		Study Period (hrs):	<i>0.25</i>			
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	6
		L	T	R	L	T	R
Volume (veh/h)		121		65	12	133	
Peak-Hour Factor, PHF	1.00	0.88		0.88	0.85	0.85	0.90
Hourly Flow Rate, HFR (veh/h)	0	0		0	85	0	13
Percent Heavy Vehicles	2	--		--	2	--	--
Median Type	<i>Undivided</i>						
RT Channelized				0			0
Lanes	0	1		0	0	1	0
Configuration				<i>TR</i>	<i>LT</i>		
Upstream Signal		0				0	
Minor Street		Eastbound			Westbound		
Movement	7	8		9	10	11	12
	L	T		R	L	T	R
Volume (veh/h)					77		12
Peak-Hour Factor, PHF	1.00	1.00		1.00	0.90	1.00	0.90
Hourly Flow Rate, HFR (veh/h)	14	156		0	0	137	73
Percent Heavy Vehicles	2	2		2	2	2	2
Percent Grade (%)		0				0	
Flared Approach		<i>N</i>				<i>N</i>	
Storage		0				0	
RT Channelized				0			0
Lanes	0	0		0	0	0	0
Configuration						<i>LR</i>	
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement	1	4		7	8	9	10
Lane Configuration		<i>LT</i>			<i>LR</i>		
v (veh/h)		14			98		
C (m) (veh/h)		1361			657		
v/c		0.01			0.15		
95% queue length		0.03			0.52		
Control Delay (s/veh)		7.7			11.4		
LOS		<i>A</i>			<i>B</i>		
Approach Delay (s/veh)	--	--			11.4		
Approach LOS	--	--			<i>B</i>		

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	John Holst		Intersection	King & Hubbard		Jurisdiction	Town of Blacksburg
Agency/Co.	Anderson & Associates		Analysis Year	2008 Buildout			
Date Performed	04-06-2007						
Analysis Time Period	PM Peak						
Project Description	First & Main, Blacksburg						
East/West Street:	King Street		North/South Street:	Hubbard Street			
Intersection Orientation:	North-South		Study Period (hrs):	0.25			
Vehicle Volumes and Adjustments							
Major Street		Northbound			Southbound		
Movement		1	2	3	4	5	6
		L	T	R	L	T	R
Volume (veh/h)		133		83	14	198	
Peak-Hour Factor, PHF	1.00	0.87		0.87	0.85	0.85	0.90
Hourly Flow Rate, HFR (veh/h)	0	0		0	98	0	14
Percent Heavy Vehicles	2	--		--	2	--	--
Median Type	Undivided						
RT Channelized				0			0
Lanes	0	1		0	0	1	0
Configuration				TR	LT		
Upstream Signal		0				0	
Minor Street		Eastbound			Westbound		
Movement	7	8		9	10	11	12
	L	T		R	L	T	R
Volume (veh/h)					89	13	
Peak-Hour Factor, PHF	1.00	1.00		1.00	0.90	1.00	0.90
Hourly Flow Rate, HFR (veh/h)	16	232		0	0	152	95
Percent Heavy Vehicles	2	2		2	2	2	2
Percent Grade (%)		0				0	
Flared Approach		N				N	
Storage		0				0	
RT Channelized				0			0
Lanes	0	0		0	0	0	0
Configuration						LR	
Delay, Queue Length, and Level of Service							
Approach		Northbound	Southbound	Westbound		Eastbound	
Movement	1	4	7	8	9	10	11
Lane Configuration			LT		LR		
v (veh/h)		16		112			
C (m) (veh/h)		1319		574			
v/c		0.01		0.20			
95% queue length		0.04		0.72			
Control Delay (s/veh)		7.8		12.8			
LOS		A		B			
Approach Delay (s/veh)	--	--		12.8			
Approach LOS	--	--		B			

Appendix B

Synchro Analysis Results

Existing Year 2004

Country Club Drive & South Main Street
Kroger/CVS Entrances & South Main Street
Hubbard Street/Ellett Road & South Main Street

Projected Year 2007 (without site traffic)

Country Club Drive & South Main Street
Kroger/CVS Entrances & South Main Street
Hubbard Street/Ellett Road & South Main Street

Background Year 2008 (without site traffic)

Country Club Drive & South Main Street
Kroger/CVS Entrances & South Main Street
Hubbard Street/Ellett Road & South Main Street

Buildout Year 2008 (with site traffic)

Country Club Drive & South Main Street
Kroger/CVS Entrances & South Main Street
Hubbard Street/Ellett Road & South Main Street
Ardmore Street/Site Entrance & South Main Street
Marlington Street/Site Entrance & South Main Street

HCM Signalized Intersection Capacity Analysis

2: Country Club & South Main Street

4/20/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓		↑	↓		↑	↑↓		↑	↑↓	↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Fr _t	1.00	0.88		1.00	0.95		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1627		1703	1766		1770	3438		1770	3505	1583
Flt Permitted	0.70	1.00		0.55	1.00		0.30	1.00		0.37	1.00	1.00
Satd. Flow (perm)	1299	1627		982	1766		550	3438		686	3505	1583
Volume (vph)	87	42	153	51	48	26	164	643	44	15	652	104
Peak-hour factor, PHF	0.91	0.88	0.80	0.80	0.80	0.80	0.80	0.93	0.80	0.94	0.95	0.90
Adj. Flow (vph)	96	48	191	64	60	32	205	691	55	16	686	116
RTOR Reduction (vph)	0	160	0	0	27	0	0	8	0	0	0	62
Lane Group Flow (vph)	96	79	0	64	65	0	205	738	0	16	686	54
Heavy Vehicles (%)	2%	2%	3%	6%	2%	2%	2%	4%	2%	2%	3%	2%
Turn Type	Perm		Perm		pm+pt		pm+pt		pm+pt		Perm	
Protected Phases		4		8		5	2		1	6		
Permitted Phases	4		8			2			6		6	
Actuated Green, G (s)	7.3	7.3		7.3	7.3		29.3	24.6		21.3	20.6	20.6
Effective Green, g (s)	7.3	7.3		7.3	7.3		29.3	24.6		21.3	20.6	20.6
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.66	0.55		0.48	0.46	0.46
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	213	266		161	289		490	1896		345	1619	731
v/s Ratio Prot		0.05			0.04		c0.04	0.21		0.00	0.20	
v/s Ratio Perm	c0.07		0.07			c0.23			0.02		0.03	
v/c Ratio	0.45	0.30		0.40	0.23		0.42	0.39		0.05	0.42	0.07
Uniform Delay, d1	16.8	16.4		16.7	16.2		3.5	5.7		6.1	8.0	6.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.5	0.6		1.6	0.4		0.6	0.1		0.1	0.2	0.0
Delay (s)	18.4	17.0		18.3	16.6		4.1	5.8		6.2	8.2	6.7
Level of Service	B	B		B	B		A	A		A	A	A
Approach Delay (s)		17.4			17.3			5.5			8.0	
Approach LOS		B			B		A			A		
Intersection Summary												
HCM Average Control Delay		9.0		HCM Level of Service			A					
HCM Volume to Capacity ratio		0.41										
Actuated Cycle Length (s)		44.6		Sum of lost time (s)			8.0					
Intersection Capacity Utilization		55.4%		ICU Level of Service			B					
Analysis Period (min)		15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

3: Kroger & South Main Street

4/20/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓		↑	↓		↑	↑↓		↑	↑↓	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Fr _t	1.00	0.89		1.00	0.87		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	1648		1770	1627		1770	3458		1770	3482	
Flt Permitted	0.53	1.00		0.68	1.00		0.37	1.00		0.29	1.00	
Satd. Flow (perm)	975	1648		1263	1627		687	3458		535	3482	
Volume (vph)	32	26	75	104	28	152	98	647	64	171	636	26
Peak-hour factor, PHF	0.89	0.81	0.82	0.80	0.80	0.80	0.80	0.95	0.89	0.86	0.95	0.80
Adj. Flow (vph)	36	32	91	130	35	190	122	681	72	199	669	32
RTOR Reduction (vph)	0	73	0	0	153	0	0	13	0	0	5	0
Lane Group Flow (vph)	36	50	0	130	72	0	122	740	0	199	696	0
Heavy Vehicles (%)	3%	4%	2%	2%	2%	2%	2%	3%	2%	2%	3%	2%
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	8.8	8.8		8.8	8.8		23.5	20.1		26.3	21.5	
Effective Green, g (s)	8.8	8.8		8.8	8.8		23.5	20.1		26.3	21.5	
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.51	0.44		0.58	0.47	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	188	317		243	313		434	1521		438	1638	
v/s Ratio Prot		0.03			0.04		0.02	0.21		c0.05	0.20	
v/s Ratio Perm	0.04			c0.10			0.12			c0.21		
v/c Ratio	0.19	0.16		0.53	0.23		0.28	0.49		0.45	0.42	
Uniform Delay, d1	15.5	15.4		16.6	15.6		5.8	9.1		5.0	8.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	0.2		2.3	0.4		0.4	0.2		0.8	0.2	
Delay (s)	16.0	15.6		18.9	16.0		6.2	9.4		5.7	8.2	
Level of Service	B	B		B	B		A	A		A	A	
Approach Delay (s)		15.7			17.0			8.9			7.6	
Approach LOS		B			B		A			A		
Intersection Summary												
HCM Average Control Delay		10.1			HCM Level of Service			B				
HCM Volume to Capacity ratio		0.44										
Actuated Cycle Length (s)		45.7			Sum of lost time (s)			8.0				
Intersection Capacity Utilization		56.9%			ICU Level of Service			B				
Analysis Period (min)		15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

8: Hubbard & South Main Street

4/20/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓			↑	↑	↑	↑	↑	↑	↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Fr _t	1.00	0.91			1.00	0.85	1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00			0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1703			1801	1583	1770	3485		1770	3519	
Flt Permitted	0.64	1.00			0.73	1.00	0.31	1.00		0.20	1.00	
Satd. Flow (perm)	1190	1703			1362	1583	582	3485		370	3519	
Volume (vph)	29	35	47	79	36	92	48	737	83	103	774	29
Peak-hour factor, PHF	0.81	0.80	0.80	0.80	0.80	0.92	0.80	0.80	0.80	0.80	0.96	0.91
Adj. Flow (vph)	36	44	59	99	45	100	60	921	104	129	806	32
RTOR Reduction (vph)	0	48	0	0	0	82	0	12	0	0	4	0
Lane Group Flow (vph)	36	55	0	0	144	18	60	1013	0	129	834	0
Turn Type	Perm		Perm		Perm	pm+pt			pm+pt			
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	11.6	11.6			11.6	11.6	37.1	34.1		41.5	36.3	
Effective Green, g (s)	11.6	11.6			11.6	11.6	37.1	34.1		41.5	36.3	
Actuated g/C Ratio	0.18	0.18			0.18	0.18	0.59	0.54		0.66	0.58	
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	219	314			251	292	400	1889		360	2031	
v/s Ratio Prot	0.03						0.01	c0.29		c0.03	0.24	
v/s Ratio Perm	0.03				c0.11	0.01	0.08			0.21		
v/c Ratio	0.16	0.17			0.57	0.06	0.15	0.54		0.36	0.41	
Uniform Delay, d1	21.6	21.6			23.4	21.2	5.5	9.3		5.1	7.4	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.3			3.2	0.1	0.2	0.3		0.6	0.1	
Delay (s)	21.9	21.9			26.5	21.3	5.7	9.6		5.7	7.5	
Level of Service	C	C			C	C	A	A		A	A	
Approach Delay (s)	21.9				24.4			9.4			7.3	
Approach LOS	C				C			A			A	
Intersection Summary												
HCM Average Control Delay	10.8				HCM Level of Service			B				
HCM Volume to Capacity ratio	0.57											
Actuated Cycle Length (s)	62.9				Sum of lost time (s)			16.0				
Intersection Capacity Utilization	51.7%				ICU Level of Service			A				
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

2: Country Club & South Main Street

4/20/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Fr _t	1.00	0.85	1.00	0.91	1.00	0.99	1.00	1.00	1.00	1.00	1.00	0.85
Flt Protected	0.97	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1808	1583	1770	1698	1770	3493	1770	3493	1770	3539	1583	1583
Flt Permitted	0.75	1.00	0.47	1.00	0.22	1.00	0.25	1.00	0.25	1.00	1.00	1.00
Satd. Flow (perm)	1393	1583	878	1698	416	3493	469	3493	469	3539	1583	1583
Volume (vph)	154	92	139	55	40	55	101	776	61	44	716	140
Peak-hour factor, PHF	0.90	0.82	0.80	0.81	0.83	0.80	0.81	0.97	0.80	0.80	0.82	0.90
Adj. Flow (vph)	171	112	174	68	48	69	125	800	76	55	873	156
RTOR Reduction (vph)	0	0	127	0	50	0	0	12	0	0	0	91
Lane Group Flow (vph)	0	283	47	68	67	0	125	864	0	55	873	65
Turn Type	Perm		Perm	Perm			pm+pt			pm+pt		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)	13.0	13.0	13.0	13.0	24.0	20.9	22.2	20.0	20.0			
Effective Green, g (s)	13.0	13.0	13.0	13.0	24.0	20.9	22.2	20.0	20.0			
Actuated g/C Ratio	0.27	0.27	0.27	0.27	0.50	0.43	0.46	0.42	0.42			
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	376	428	237	459	295	1518	276	1472	658			
v/s Ratio Prot				0.04	c0.03	c0.25	0.01	0.25				
v/s Ratio Perm	c0.20	0.03	0.08		0.18		0.08		0.04			
v/c Ratio	0.75	0.11	0.29	0.15	0.42	0.57	0.20	0.59	0.10			
Uniform Delay, d1	16.1	13.2	13.9	13.3	7.1	10.2	7.4	10.9	8.6			
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	8.3	0.1	0.7	0.1	1.0	0.5	0.4	0.6	0.1			
Delay (s)	24.3	13.3	14.6	13.5	8.0	10.7	7.8	11.5	8.6			
Level of Service	C	B	B	B	A	B	A	B	A			
Approach Delay (s)	20.1			13.9		10.4			10.9			
Approach LOS	C			B		B			B			
Intersection Summary												
HCM Average Control Delay	12.5				HCM Level of Service		B					
HCM Volume to Capacity ratio	0.57											
Actuated Cycle Length (s)	48.1				Sum of lost time (s)		8.0					
Intersection Capacity Utilization	56.8%				ICU Level of Service		B					
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: Kroger & South Main Street

4/20/2007

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓		↑	↓		↑	↑↓		↑	↑↓	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Fr _t	1.00	0.88		1.00	0.87		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1634		1770	1619		1770	3515		1770	3518	
Flt Permitted	0.66	1.00		0.67	1.00		0.23	1.00		0.26	1.00	
Satd. Flow (perm)	1226	1634		1241	1619		433	3515		482	3518	
Volume (vph)	42	21	96	80	17	109	120	731	33	137	760	31
Peak-hour factor, PHF	0.80	0.80	0.83	0.80	0.85	0.80	0.80	0.86	0.80	0.80	0.83	0.80
Adj. Flow (vph)	52	26	116	100	20	136	150	850	41	171	916	39
RTOR Reduction (vph)	0	95	0	0	111	0	0	6	0	0	5	0
Lane Group Flow (vph)	52	47	0	100	45	0	150	886	0	171	951	0
Turn Type	Perm		Perm			pm+pt			pm+pt			
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	8.9	8.9		8.9	8.9		28.3	24.6		28.3	24.6	
Effective Green, g (s)	8.9	8.9		8.9	8.9		28.3	24.6		28.3	24.6	
Actuated g/C Ratio	0.18	0.18		0.18	0.18		0.58	0.50		0.58	0.50	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	222	296		224	293		350	1758		374	1759	
v/s Ratio Prot		0.03			0.03		0.03	0.25		c0.03	c0.27	
v/s Ratio Perm	0.04		c0.08			0.21			0.23			
v/c Ratio	0.23	0.16		0.45	0.15		0.43	0.50		0.46	0.54	
Uniform Delay, d1	17.2	17.0		18.0	17.0		5.3	8.2		5.2	8.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	0.3		1.4	0.2		0.8	0.2		0.9	0.3	
Delay (s)	17.8	17.2		19.4	17.2		6.1	8.4		6.1	8.8	
Level of Service	B	B		B	B		A	A		A	A	
Approach Delay (s)		17.4			18.1			8.1			8.4	
Approach LOS		B			B			A			A	
Intersection Summary												
HCM Average Control Delay		9.9			HCM Level of Service			A				
HCM Volume to Capacity ratio		0.51										
Actuated Cycle Length (s)		49.2			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		53.6%			ICU Level of Service			A				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

8: Hubbard & South Main Street

4/20/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓			↑	↑	↑	↑	↑	↑	↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Fr _t	1.00	0.92			1.00	0.85	1.00	0.98		1.00	1.00	
Flt Protected	0.95	1.00			0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1712			1769	1583	1770	3460		1770	3525	
Flt Permitted	0.64	1.00			0.63	1.00	0.27	1.00		0.15	1.00	
Satd. Flow (perm)	1200	1712			1145	1583	496	3460		279	3525	
Volume (vph)	28	65	76	85	44	150	59	851	148	172	784	21
Peak-hour factor, PHF	0.80	0.80	0.80	0.85	0.85	0.91	0.80	0.89	0.88	0.81	0.82	0.80
Adj. Flow (vph)	35	81	95	100	52	165	74	956	168	212	956	26
RTOR Reduction (vph)	0	79	0	0	0	137	0	20	0	0	3	0
Lane Group Flow (vph)	35	97	0	0	152	28	74	1104	0	212	979	0
Heavy Vehicles (%)	2%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm		Perm		Perm	pm+pt			pm+pt			
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		8		8	2			6			
Actuated Green, G (s)	9.5	9.5			9.5	9.5	30.6	27.9		37.2	31.2	
Effective Green, g (s)	9.5	9.5			9.5	9.5	30.6	27.9		37.2	31.2	
Actuated g/C Ratio	0.17	0.17			0.17	0.17	0.55	0.50		0.67	0.56	
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	206	294			196	271	336	1742		349	1985	
v/s Ratio Prot		0.06					0.01	0.32		c0.07	0.28	
v/s Ratio Perm	0.03		c0.13	0.02	0.11				c0.34			
v/c Ratio	0.17	0.33			0.78	0.10	0.22	0.63		0.61	0.49	
Uniform Delay, d1	19.6	20.2			21.9	19.4	5.9	10.0		6.1	7.3	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		0.98	1.01	
Incremental Delay, d2	0.4	0.7			17.3	0.2	0.3	0.8		3.0	0.2	
Delay (s)	20.0	20.8			39.2	19.5	6.2	10.8		9.0	7.6	
Level of Service	B	C		D	B	A	B		A	A		
Approach Delay (s)		20.7			29.0			10.5			7.8	
Approach LOS		C			C		B			A		
Intersection Summary												
HCM Average Control Delay		12.1			HCM Level of Service			B				
HCM Volume to Capacity ratio		0.68										
Actuated Cycle Length (s)		55.4			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		66.2%			ICU Level of Service			C				
Analysis Period (min)		15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

2: Country Club & South Main Street

4/20/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Fr _t	1.00	0.85	1.00	0.95	1.00	1.00	0.99	1.00	1.00	1.00	1.00	0.85
Flt Protected	0.97	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1803	1568	1703	1764		1770	3438		1770	3505	1583	
Flt Permitted	0.74	1.00	0.66	1.00		0.38	1.00		0.24	1.00	1.00	
Satd. Flow (perm)	1381	1568	1186	1764		703	3438		438	3505	1583	
Volume (vph)	91	44	161	54	50	27	172	675	46	16	685	109
Peak-hour factor, PHF	0.91	0.88	0.80	0.80	0.80	0.80	0.80	0.93	0.80	0.94	0.95	0.90
Adj. Flow (vph)	100	50	201	68	62	34	215	726	58	17	721	121
RTOR Reduction (vph)	0	0	165	0	28	0	0	8	0	0	0	71
Lane Group Flow (vph)	0	150	36	68	68	0	215	776	0	17	721	50
Heavy Vehicles (%)	2%	2%	3%	6%	2%	2%	2%	4%	2%	2%	3%	2%
Turn Type	Perm		Perm	Perm			pm+pt		pm+pt		Perm	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)	8.6	8.6	8.6	8.6		26.1	26.1		19.5	19.5	19.5	
Effective Green, g (s)	8.6	8.6	8.6	8.6		26.1	26.1		19.5	19.5	19.5	
Actuated g/C Ratio	0.18	0.18	0.18	0.18		0.55	0.55		0.41	0.41	0.41	
Clearance Time (s)	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	251	284	215	320		551	1893		200	1442	651	
v/s Ratio Prot				0.04		0.06	c0.23		0.00	c0.21		
v/s Ratio Perm	c0.11	0.02	0.06			0.15			0.03		0.03	
v/c Ratio	0.60	0.13	0.32	0.21		0.39	0.41		0.08	0.50	0.08	
Uniform Delay, d1	17.8	16.3	16.8	16.5		6.9	6.2		8.7	10.3	8.5	
Progression Factor	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00	
Incremental Delay, d2	3.8	0.2	0.8	0.3		0.5	0.1		0.2	0.3	0.1	
Delay (s)	21.6	16.5	17.7	16.9		7.4	6.3		8.9	10.6	8.5	
Level of Service	C	B	B	B		A	A		A	B	A	
Approach Delay (s)	18.7			17.2			6.5			10.3		
Approach LOS	B			B			A			B		
Intersection Summary												
HCM Average Control Delay	10.4				HCM Level of Service			B				
HCM Volume to Capacity ratio	0.48											
Actuated Cycle Length (s)	47.4				Sum of lost time (s)			8.0				
Intersection Capacity Utilization	52.5%				ICU Level of Service			A				
Analysis Period (min)	15											

c = Critical Lane Group

HCM Signalized Intersection Capacity Analysis

3: Kroger & South Main Street

4/20/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓		↑	↓		↑	↑↓		↑	↑↓	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Fr _t	1.00	0.89		1.00	0.87		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	1647		1770	1626		1770	3458		1770	3482	
Flt Permitted	0.48	1.00		0.67	1.00		0.35	1.00		0.26	1.00	
Satd. Flow (perm)	890	1647		1256	1626		644	3458		487	3482	
Volume (vph)	34	27	79	109	29	160	103	679	67	180	668	27
Peak-hour factor, PHF	0.89	0.81	0.82	0.80	0.80	0.80	0.80	0.95	0.89	0.86	0.95	0.80
Adj. Flow (vph)	38	33	96	136	36	200	129	715	75	209	703	34
RTOR Reduction (vph)	0	78	0	0	163	0	0	12	0	0	5	0
Lane Group Flow (vph)	38	51	0	136	73	0	129	778	0	209	732	0
Heavy Vehicles (%)	3%	4%	2%	2%	2%	2%	2%	3%	2%	2%	3%	2%
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	8.9	8.9		8.9	8.9		25.4	20.7		28.6	22.3	
Effective Green, g (s)	8.9	8.9		8.9	8.9		25.4	20.7		28.6	22.3	
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.53	0.43		0.60	0.47	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	165	306		233	302		452	1494		460	1621	
v/s Ratio Prot		0.03			0.04		0.03	c0.22		c0.06	0.21	
v/s Ratio Perm	0.04			c0.11			0.12			0.21		
v/c Ratio	0.23	0.17		0.58	0.24		0.29	0.52		0.45	0.45	
Uniform Delay, d1	16.6	16.4		17.8	16.6		5.7	10.0		4.9	8.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	0.3		3.7	0.4		0.3	0.3		0.7	0.2	
Delay (s)	17.3	16.6		21.5	17.0		6.1	10.3		5.6	8.9	
Level of Service	B	B		C	B		A	B		A	A	
Approach Delay (s)		16.8			18.7			9.7			8.1	
Approach LOS		B			B			A			A	
Intersection Summary												
HCM Average Control Delay		11.0			HCM Level of Service			B				
HCM Volume to Capacity ratio		0.59										
Actuated Cycle Length (s)		47.9			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		58.9%			ICU Level of Service			B				
Analysis Period (min)		15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

8: Hubbard & South Main Street

4/20/2007

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓			↑	↑	↑	↑		↑	↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Fr _t	1.00	0.91			1.00	0.85	1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00			0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1703			1801	1583	1770	3485		1770	3519	
Flt Permitted	0.62	1.00			0.73	1.00	0.29	1.00		0.18	1.00	
Satd. Flow (perm)	1150	1703			1359	1583	549	3485		338	3519	
Volume (vph)	30	37	49	83	38	97	50	774	87	108	813	30
Peak-hour factor, PHF	0.81	0.80	0.80	0.80	0.80	0.92	0.80	0.80	0.80	0.80	0.96	0.91
Adj. Flow (vph)	37	46	61	104	48	105	62	968	109	135	847	33
RTOR Reduction (vph)	0	50	0	0	0	85	0	12	0	0	4	0
Lane Group Flow (vph)	37	57	0	0	152	20	62	1065	0	135	876	0
Turn Type	Perm		Perm		Perm	pm+pt			pm+pt			
Protected Phases	4				8		5	2		1	6	
Permitted Phases	4				8		8	2		6		
Actuated Green, G (s)	12.0	12.0			12.0	12.0	37.6	34.7		42.2	37.0	
Effective Green, g (s)	12.0	12.0			12.0	12.0	37.6	34.7		42.2	37.0	
Actuated g/C Ratio	0.19	0.19			0.19	0.19	0.59	0.54		0.66	0.58	
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	216	320			255	297	378	1892		340	2038	
v/s Ratio Prot	0.03						0.01	c0.31		c0.03	0.25	
v/s Ratio Perm	0.03				c0.11	0.01	0.09			0.23		
v/c Ratio	0.17	0.18			0.60	0.07	0.16	0.56		0.40	0.43	
Uniform Delay, d ₁	21.8	21.8			23.7	21.3	5.7	9.6		5.5	7.5	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d ₂	0.4	0.3			3.7	0.1	0.2	0.4		0.8	0.1	
Delay (s)	22.2	22.1			27.4	21.4	5.9	10.0		6.2	7.7	
Level of Service	C	C			C	C	A	A		A	A	
Approach Delay (s)	22.1				25.0			9.8		7.5		
Approach LOS	C				C			A		A		
Intersection Summary												
HCM Average Control Delay	11.1				HCM Level of Service			B				
HCM Volume to Capacity ratio	0.60											
Actuated Cycle Length (s)	63.9				Sum of lost time (s)			16.0				
Intersection Capacity Utilization	53.4%				ICU Level of Service			A				
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

2: Country Club & South Main Street

4/20/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Fr _t	1.00	0.85	1.00	0.91		1.00	0.99		1.00	1.00	1.00	0.85
Flt Protected	0.97	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1808	1583	1770	1699		1770	3493		1770	3539	1583	
Flt Permitted	0.74	1.00	0.45	1.00		0.20	1.00		0.23	1.00	1.00	
Satd. Flow (perm)	1387	1583	842	1699		374	3493		425	3539	1583	
Volume (vph)	162	97	146	58	42	58	106	815	64	46	752	147
Peak-hour factor, PHF	0.90	0.82	0.80	0.81	0.83	0.80	0.81	0.97	0.80	0.80	0.82	0.90
Adj. Flow (vph)	180	118	182	72	51	72	131	840	80	58	917	163
RTOR Reduction (vph)	0	0	132	0	52	0	0	13	0	0	0	96
Lane Group Flow (vph)	0	298	50	72	71	0	131	907	0	58	917	67
Turn Type	Perm		Perm	Perm			pm+pt			pm+pt		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)	13.4	13.4	13.4	13.4		23.8	20.7		22.0	19.8	19.8	
Effective Green, g (s)	13.4	13.4	13.4	13.4		23.8	20.7		22.0	19.8	19.8	
Actuated g/C Ratio	0.28	0.28	0.28	0.28		0.49	0.43		0.46	0.41	0.41	
Clearance Time (s)	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	385	439	234	471		274	1497		255	1451	649	
v/s Ratio Prot				0.04		c0.03	c0.26		0.01	0.26		
v/s Ratio Perm	c0.21	0.03	0.09			0.20			0.09		0.04	
v/c Ratio	0.77	0.12	0.31	0.15		0.48	0.61		0.23	0.63	0.10	
Uniform Delay, d1	16.1	13.0	13.8	13.2		7.4	10.7		7.7	11.3	8.8	
Progression Factor	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00	
Incremental Delay, d2	9.4	0.1	0.8	0.1		1.3	0.7		0.5	0.9	0.1	
Delay (s)	25.4	13.1	14.5	13.3		8.7	11.4		8.2	12.3	8.8	
Level of Service	C	B	B	B		A	B		A	B	A	
Approach Delay (s)	20.8			13.8			11.0			11.6		
Approach LOS	C			B			B			B		
Intersection Summary												
HCM Average Control Delay	13.1				HCM Level of Service				B			
HCM Volume to Capacity ratio	0.61											
Actuated Cycle Length (s)	48.3				Sum of lost time (s)			8.0				
Intersection Capacity Utilization	58.6%				ICU Level of Service				B			
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: Kroger & South Main Street

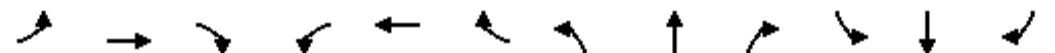
4/20/2007

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓		↑	↓		↑	↑↓		↑	↑↓	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Fr _t	1.00	0.88		1.00	0.87		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1635		1770	1619		1770	3514		1770	3517	
Flt Permitted	0.60	1.00		0.63	1.00		0.21	1.00		0.23	1.00	
Satd. Flow (perm)	1111	1635		1177	1619		394	3514		437	3517	
Volume (vph)	44	22	101	84	18	114	126	768	35	144	798	33
Peak-hour factor, PHF	0.80	0.80	0.83	0.80	0.85	0.80	0.80	0.86	0.80	0.80	0.83	0.80
Adj. Flow (vph)	55	28	122	105	21	142	158	893	44	180	961	41
RTOR Reduction (vph)	0	101	0	0	118	0	0	5	0	0	4	0
Lane Group Flow (vph)	55	49	0	105	45	0	158	932	0	180	998	0
Turn Type	Perm		Perm			pm+pt			pm+pt			
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	9.9	9.9		9.9	9.9		36.8	30.0		37.0	30.1	
Effective Green, g (s)	9.9	9.9		9.9	9.9		36.8	30.0		37.0	30.1	
Actuated g/C Ratio	0.17	0.17		0.17	0.17		0.63	0.51		0.63	0.51	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	187	275		198	273		406	1793		431	1800	
v/s Ratio Prot	0.03			0.03			0.05	0.27		c0.05	c0.28	
v/s Ratio Perm	0.05		c0.09			0.20			0.21			
v/c Ratio	0.29	0.18		0.53	0.16		0.39	0.52		0.42	0.55	
Uniform Delay, d1	21.4	21.0		22.3	20.9		5.3	9.6		5.1	9.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	0.3		2.7	0.3		0.6	0.3		0.7	0.4	
Delay (s)	22.3	21.3		25.0	21.2		5.9	9.9		5.8	10.2	
Level of Service	C	C		C	C		A	A		A	B	
Approach Delay (s)		21.5			22.7			9.3			9.5	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM Average Control Delay	11.6		HCM Level of Service			B						
HCM Volume to Capacity ratio	0.49											
Actuated Cycle Length (s)	58.8		Sum of lost time (s)			8.0						
Intersection Capacity Utilization	55.7%		ICU Level of Service			B						
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

8: Hubbard & South Main Street

4/20/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓			↑	↑	↑	↑		↑	↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Fr _t	1.00	0.92			1.00	0.85	1.00	0.98		1.00	1.00	
Flt Protected	0.95	1.00			0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1712			1769	1583	1770	3460		1770	3525	
Flt Permitted	0.63	1.00			0.61	1.00	0.24	1.00		0.14	1.00	
Satd. Flow (perm)	1172	1712			1107	1583	445	3460		261	3525	
Volume (vph)	29	68	80	89	46	158	62	894	155	181	823	22
Peak-hour factor, PHF	0.80	0.80	0.80	0.85	0.85	0.91	0.80	0.89	0.88	0.81	0.82	0.80
Adj. Flow (vph)	36	85	100	105	54	174	78	1004	176	223	1004	28
RTOR Reduction (vph)	0	79	0	0	0	144	0	20	0	0	3	0
Lane Group Flow (vph)	36	106	0	0	159	30	78	1160	0	223	1029	0
Heavy Vehicles (%)	2%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm		Perm		Perm	pm+pt		pm+pt		pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		8		8	2				6		
Actuated Green, G (s)	9.6	9.6			9.6	9.6	30.8	28.1		36.0	30.7	
Effective Green, g (s)	9.6	9.6			9.6	9.6	30.8	28.1		36.0	30.7	
Actuated g/C Ratio	0.17	0.17			0.17	0.17	0.56	0.51		0.65	0.56	
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	205	299			193	276	314	1768		316	1968	
v/s Ratio Prot		0.06					0.01	0.34		c0.07	0.29	
v/s Ratio Perm	0.03		c0.14	0.02	0.13					c0.39		
v/c Ratio	0.18	0.35			0.82	0.11	0.25	0.66		0.71	0.52	
Uniform Delay, d1	19.3	20.0			21.9	19.1	5.7	9.9		6.7	7.6	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		0.99	1.01	
Incremental Delay, d2	0.4	0.7			23.9	0.2	0.4	0.9		7.0	0.3	
Delay (s)	19.7	20.7			45.8	19.3	6.1	10.8		13.6	7.9	
Level of Service	B	C		D	B	A	B			B	A	
Approach Delay (s)		20.5			31.9			10.5			8.9	
Approach LOS		C			C		B				A	
Intersection Summary												
HCM Average Control Delay		12.9			HCM Level of Service			B				
HCM Volume to Capacity ratio		0.77										
Actuated Cycle Length (s)		55.0			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		68.8%			ICU Level of Service			C				
Analysis Period (min)		15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

2: Country Club & South Main Street

4/20/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Fr _t	1.00	0.85	1.00	0.95	1.00	1.00	0.99	1.00	1.00	1.00	1.00	0.85
Flt Protected	0.97	1.00	0.95	1.00			0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1803	1568	1703	1764			1770	3438		1770	3505	1583
Flt Permitted	0.74	1.00	0.66	1.00			0.27	1.00		0.35	1.00	1.00
Satd. Flow (perm)	1378	1568	1183	1764			502	3438		651	3505	1583
Volume (vph)	93	45	164	55	51	28	175	688	47	16	698	111
Peak-hour factor, PHF	0.91	0.88	0.80	0.80	0.80	0.80	0.80	0.93	0.80	0.94	0.95	0.90
Adj. Flow (vph)	102	51	205	69	64	35	219	740	59	17	735	123
RTOR Reduction (vph)	0	0	169	0	29	0	0	8	0	0	0	67
Lane Group Flow (vph)	0	153	36	69	70	0	219	791	0	17	735	56
Heavy Vehicles (%)	2%	2%	3%	6%	2%	2%	2%	4%	2%	2%	3%	2%
Turn Type	Perm		Perm	Perm			pm+pt		pm+pt		Perm	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)	9.0	9.0	9.0	9.0			34.6	29.9		24.4	23.7	23.7
Effective Green, g (s)	9.0	9.0	9.0	9.0			34.6	29.9		24.4	23.7	23.7
Actuated g/C Ratio	0.17	0.17	0.17	0.17			0.67	0.58		0.47	0.46	0.46
Clearance Time (s)	4.0	4.0	4.0	4.0			4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0			3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	240	273	206	308			506	1992		323	1610	727
v/s Ratio Prot				0.04			c0.06	0.23		0.00	0.21	
v/s Ratio Perm	c0.11	0.02	0.06				c0.23			0.02		0.04
v/c Ratio	0.64	0.13	0.33	0.23			0.43	0.40		0.05	0.46	0.08
Uniform Delay, d1	19.8	18.0	18.7	18.3			4.0	5.9		7.2	9.5	7.8
Progression Factor	1.00	1.00	1.00	1.00			1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.5	0.2	1.0	0.4			0.6	0.1		0.1	0.2	0.0
Delay (s)	25.2	18.2	19.6	18.7			4.6	6.1		7.3	9.8	7.9
Level of Service	C	B	B	B			A	A		A	A	A
Approach Delay (s)	21.2			19.1				5.7			9.4	
Approach LOS	C			B			A			A		
Intersection Summary												
HCM Average Control Delay	10.3				HCM Level of Service			B				
HCM Volume to Capacity ratio	0.46											
Actuated Cycle Length (s)	51.6				Sum of lost time (s)			8.0				
Intersection Capacity Utilization	53.2%				ICU Level of Service			A				
Analysis Period (min)	15											

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

3: Kroger & South Main Street

4/20/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓		↑	↓		↑	↑↓		↑	↑↓	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Fr _t	1.00	0.89		1.00	0.87		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	1648		1770	1627		1770	3458		1770	3482	
Flt Permitted	0.47	1.00		0.67	1.00		0.34	1.00		0.25	1.00	
Satd. Flow (perm)	870	1648		1252	1627		629	3458		474	3482	
Volume (vph)	34	28	80	111	30	163	105	692	68	183	681	28
Peak-hour factor, PHF	0.89	0.81	0.82	0.80	0.80	0.80	0.80	0.95	0.89	0.86	0.95	0.80
Adj. Flow (vph)	38	35	98	139	38	204	131	728	76	213	717	35
RTOR Reduction (vph)	0	80	0	0	166	0	0	12	0	0	5	0
Lane Group Flow (vph)	38	53	0	139	76	0	131	792	0	213	747	0
Heavy Vehicles (%)	3%	4%	2%	2%	2%	2%	2%	3%	2%	2%	3%	2%
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	9.0	9.0		9.0	9.0		25.2	20.6		28.4	22.2	
Effective Green, g (s)	9.0	9.0		9.0	9.0		25.2	20.6		28.4	22.2	
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.53	0.43		0.59	0.46	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	164	310		236	306		441	1490		450	1617	
v/s Ratio Prot		0.03			0.05		0.03	c0.23		c0.06	0.21	
v/s Ratio Perm	0.04			c0.11			0.13			0.22		
v/c Ratio	0.23	0.17		0.59	0.25		0.30	0.53		0.47	0.46	
Uniform Delay, d1	16.5	16.3		17.7	16.5		5.8	10.0		5.0	8.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	0.3		3.7	0.4		0.4	0.4		0.8	0.2	
Delay (s)	17.2	16.5		21.4	17.0		6.2	10.4		5.8	8.9	
Level of Service	B	B		C	B		A	B		A	A	
Approach Delay (s)		16.7			18.6			9.8			8.2	
Approach LOS		B			B			A			A	
Intersection Summary												
HCM Average Control Delay		11.0			HCM Level of Service			B				
HCM Volume to Capacity ratio		0.60										
Actuated Cycle Length (s)		47.8			Sum of lost time (s)			16.0				
Intersection Capacity Utilization		59.7%			ICU Level of Service			B				
Analysis Period (min)		15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

8: Hubbard & South Main Street

4/20/2007

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Fr _t	1.00	0.91			1.00	0.85	1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00			0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1702			1801	1583	1770	3485		1770	3519	
Flt Permitted	0.63	1.00			0.73	1.00	0.30	1.00		0.17	1.00	
Satd. Flow (perm)	1168	1702			1358	1583	552	3485		318	3519	
Volume (vph)	31	37	50	85	39	98	51	789	89	110	828	31
Peak-hour factor, PHF	0.81	0.80	0.80	0.80	0.80	0.92	0.80	0.80	0.80	0.80	0.96	0.91
Adj. Flow (vph)	38	46	62	106	49	107	64	986	111	138	862	34
RTOR Reduction (vph)	0	51	0	0	0	88	0	12	0	0	4	0
Lane Group Flow (vph)	38	57	0	0	155	19	64	1085	0	138	892	0
Turn Type	Perm		Perm		Perm	pm+pt			pm+pt			
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		8		8	2			6			
Actuated Green, G (s)	10.0	10.0			10.0	10.0	32.9	30.5		38.1	33.1	
Effective Green, g (s)	10.0	10.0			10.0	10.0	32.9	30.5		38.1	33.1	
Actuated g/C Ratio	0.17	0.17			0.17	0.17	0.57	0.53		0.66	0.58	
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	203	296			236	275	367	1849		337	2026	
v/s Ratio Prot	0.03						0.01	c0.31		c0.04	0.25	
v/s Ratio Perm	0.03				c0.11	0.01	0.09			0.24		
v/c Ratio	0.19	0.19			0.66	0.07	0.17	0.59		0.41	0.44	
Uniform Delay, d1	20.3	20.3			22.1	19.9	5.5	9.2		5.1	6.9	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		0.99	1.01	
Incremental Delay, d2	0.4	0.3			6.4	0.1	0.2	0.5		0.8	0.2	
Delay (s)	20.7	20.6			28.6	20.0	5.7	9.7		5.9	7.1	
Level of Service	C	C			C	B	A	A		A	A	
Approach Delay (s)	20.6				25.1			9.5		7.0		
Approach LOS	C				C			A		A		
Intersection Summary												
HCM Average Control Delay	10.7				HCM Level of Service			B				
HCM Volume to Capacity ratio	0.64											
Actuated Cycle Length (s)	57.5				Sum of lost time (s)			16.0				
Intersection Capacity Utilization	54.2%				ICU Level of Service			A				
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

2: Country Club & South Main Street

4/20/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Fr _t	1.00	0.85	1.00	0.91			1.00	0.99		1.00	1.00	0.85
Flt Protected	0.97	1.00	0.95	1.00			0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1808	1583	1770	1699			1770	3493		1770	3539	1583
Flt Permitted	0.74	1.00	0.45	1.00			0.20	1.00		0.22	1.00	1.00
Satd. Flow (perm)	1384	1583	832	1699			363	3493		407	3539	1583
Volume (vph)	165	98	149	59	43	59	108	830	65	47	766	150
Peak-hour factor, PHF	0.90	0.82	0.80	0.81	0.83	0.80	0.81	0.97	0.80	0.80	0.82	0.90
Adj. Flow (vph)	183	120	186	73	52	74	133	856	81	59	934	167
RTOR Reduction (vph)	0	0	134	0	53	0	0	13	0	0	0	99
Lane Group Flow (vph)	0	303	52	73	73	0	133	924	0	59	934	68
Turn Type	Perm		Perm	Perm			pm+pt			pm+pt		Perm
Protected Phases	4				8		5	2		1	6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)	13.5	13.5	13.5	13.5			23.6	20.5		21.8	19.6	19.6
Effective Green, g (s)	13.5	13.5	13.5	13.5			23.6	20.5		21.8	19.6	19.6
Actuated g/C Ratio	0.28	0.28	0.28	0.28			0.49	0.43		0.45	0.41	0.41
Clearance Time (s)	4.0	4.0	4.0	4.0			4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0			3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	388	443	233	476			268	1486		246	1439	644
v/s Ratio Prot				0.04			c0.03	c0.26		0.01	0.26	
v/s Ratio Perm	c0.22	0.03	0.09				0.21			0.10		0.04
v/c Ratio	0.78	0.12	0.31	0.15			0.50	0.62		0.24	0.65	0.11
Uniform Delay, d1	16.0	12.9	13.7	13.0			7.6	10.8		7.8	11.5	8.9
Progression Factor	1.00	1.00	1.00	1.00			1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	9.8	0.1	0.8	0.1			1.4	0.8		0.5	1.0	0.1
Delay (s)	25.8	13.0	14.5	13.2			9.0	11.6		8.3	12.5	8.9
Level of Service	C	B	B	B			A	B		A	B	A
Approach Delay (s)	20.9				13.7			11.3			11.8	
Approach LOS	C				B			B			B	
Intersection Summary												
HCM Average Control Delay	13.3				HCM Level of Service			B				
HCM Volume to Capacity ratio	0.62											
Actuated Cycle Length (s)	48.2				Sum of lost time (s)			8.0				
Intersection Capacity Utilization	59.3%				ICU Level of Service			B				
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: Kroger & South Main Street

4/20/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓		↑	↓		↑	↑↓		↑	↑↓	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Fr _t	1.00	0.88		1.00	0.87		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1635		1770	1618		1770	3515		1770	3518	
Flt Permitted	0.59	1.00		0.63	1.00		0.20	1.00		0.23	1.00	
Satd. Flow (perm)	1103	1635		1179	1618		382	3515		425	3518	
Volume (vph)	45	22	103	86	18	117	128	782	35	147	813	33
Peak-hour factor, PHF	0.80	0.80	0.83	0.80	0.85	0.80	0.80	0.86	0.80	0.80	0.83	0.80
Adj. Flow (vph)	56	28	124	108	21	146	160	909	44	184	980	41
RTOR Reduction (vph)	0	103	0	0	122	0	0	5	0	0	4	0
Lane Group Flow (vph)	56	49	0	108	45	0	160	948	0	184	1017	0
Turn Type	Perm		Perm			pm+pt			pm+pt			
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	9.6	9.6		9.6	9.6		35.6	29.1		35.8	29.2	
Effective Green, g (s)	9.6	9.6		9.6	9.6		35.6	29.1		35.8	29.2	
Actuated g/C Ratio	0.17	0.17		0.17	0.17		0.62	0.51		0.62	0.51	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	185	274		198	271		395	1785		420	1793	
v/s Ratio Prot		0.03			0.03		0.05	0.27		c0.05	c0.29	
v/s Ratio Perm	0.05		c0.09			0.21			0.22			
v/c Ratio	0.30	0.18		0.55	0.17		0.41	0.53		0.44	0.57	
Uniform Delay, d1	20.9	20.5		21.9	20.4		5.3	9.5		5.1	9.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	0.3		3.1	0.3		0.7	0.3		0.7	0.4	
Delay (s)	21.8	20.8		24.9	20.7		6.0	9.8		5.9	10.1	
Level of Service	C	C		C	C		A	A		A	B	
Approach Delay (s)		21.1			22.4			9.3			9.5	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM Average Control Delay		11.5		HCM Level of Service			B					
HCM Volume to Capacity ratio		0.50										
Actuated Cycle Length (s)		57.3		Sum of lost time (s)			8.0					
Intersection Capacity Utilization		56.5%		ICU Level of Service			B					
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

8: Hubbard & South Main Street

4/20/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓			↑	↑	↑	↑		↑	↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Fr _t	1.00	0.92			1.00	0.85	1.00	0.98		1.00	1.00	
Flt Protected	0.95	1.00			0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1713			1769	1583	1770	3460		1770	3525	
Flt Permitted	0.62	1.00			0.59	1.00	0.23	1.00		0.13	1.00	
Satd. Flow (perm)	1153	1713			1085	1583	431	3460		249	3525	
Volume (vph)	30	70	81	91	47	161	63	911	158	184	839	22
Peak-hour factor, PHF	0.80	0.80	0.80	0.85	0.85	0.91	0.80	0.89	0.88	0.81	0.82	0.80
Adj. Flow (vph)	38	88	101	107	55	177	79	1024	180	227	1023	28
RTOR Reduction (vph)	0	77	0	0	0	146	0	20	0	0	3	0
Lane Group Flow (vph)	38	112	0	0	162	31	79	1184	0	227	1048	0
Heavy Vehicles (%)	2%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm		Perm		Perm	pm+pt			pm+pt			
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		8		8	2			6			
Actuated Green, G (s)	9.8	9.8			9.8	9.8	31.2	28.5		36.4	31.1	
Effective Green, g (s)	9.8	9.8			9.8	9.8	31.2	28.5		36.4	31.1	
Actuated g/C Ratio	0.18	0.18			0.18	0.18	0.56	0.51		0.65	0.56	
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	203	302			191	279	307	1774		308	1972	
v/s Ratio Prot		0.07					0.01	0.34		c0.07	0.30	
v/s Ratio Perm	0.03		c0.15	0.02	0.13				c0.41			
v/c Ratio	0.19	0.37			0.85	0.11	0.26	0.67		0.74	0.53	
Uniform Delay, d1	19.5	20.2			22.2	19.2	5.8	10.0		7.1	7.7	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		0.99	1.01	
Incremental Delay, d2	0.4	0.8			27.8	0.2	0.4	1.0		8.9	0.3	
Delay (s)	20.0	20.9			50.0	19.4	6.2	11.0		15.9	8.0	
Level of Service	B	C		D	B	A	B		B	A		
Approach Delay (s)		20.8			34.0			10.7			9.4	
Approach LOS		C			C			B			A	
Intersection Summary												
HCM Average Control Delay		13.4			HCM Level of Service			B				
HCM Volume to Capacity ratio		0.80										
Actuated Cycle Length (s)		55.6			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		69.9%			ICU Level of Service			C				
Analysis Period (min)		15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

2: Country Club & South Main

4/20/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	0.95	1.00	1.00	0.99	0.99	1.00	1.00	1.00	0.85
Flt Protected	0.96	1.00	0.95	1.00	1.00	1.00	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1797	1568	1703	1772		1770	3446		1770	3505	1583	
Flt Permitted	0.72	1.00	0.51	1.00	1.00	0.15	1.00	1.00	0.23	1.00	1.00	1.00
Satd. Flow (perm)	1338	1568	916	1772		284	3446		429	3505	1583	
Volume (vph)	149	52	164	62	59	28	211	970	54	16	987	169
Peak-hour factor, PHF	0.91	0.88	0.85	0.85	0.85	0.85	0.88	0.93	0.88	0.94	0.95	0.90
Adj. Flow (vph)	164	59	193	73	69	33	240	1043	61	17	1039	188
RTOR Reduction (vph)	0	0	143	0	26	0	0	6	0	0	0	101
Lane Group Flow (vph)	0	223	50	73	76	0	240	1098	0	17	1039	87
Heavy Vehicles (%)	2%	2%	3%	6%	2%	2%	2%	4%	2%	2%	3%	2%
Turn Type	Perm		Perm	Perm			pm+pt		pm+pt		Perm	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)	12.7	12.7	12.7	12.7		36.0	31.3		26.7	26.0	26.0	
Effective Green, g (s)	12.7	12.7	12.7	12.7		36.0	31.3		26.7	26.0	26.0	
Actuated g/C Ratio	0.22	0.22	0.22	0.22		0.63	0.55		0.47	0.46	0.46	
Clearance Time (s)	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	300	351	205	397		338	1902		219	1607	726	
v/s Ratio Prot				0.04		c0.08	0.32		0.00	0.30		
v/s Ratio Perm	c0.17	0.03	0.08			c0.38			0.04		0.06	
v/c Ratio	0.74	0.14	0.36	0.19		0.71	0.58		0.08	0.65	0.12	
Uniform Delay, d1	20.5	17.6	18.6	17.8		7.3	8.4		8.1	11.8	8.8	
Progression Factor	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00	
Incremental Delay, d2	9.6	0.2	1.1	0.2		6.9	0.4		0.2	0.9	0.1	
Delay (s)	30.0	17.8	19.6	18.1		14.2	8.8		8.2	12.7	8.9	
Level of Service	C	B	B	B		B	A		A	B	A	
Approach Delay (s)	24.4			18.7			9.7			12.1		
Approach LOS	C			B			A			B		
Intersection Summary												
HCM Average Control Delay	13.1				HCM Level of Service				B			
HCM Volume to Capacity ratio	0.70											
Actuated Cycle Length (s)	56.7				Sum of lost time (s)				8.0			
Intersection Capacity Utilization	66.6%				ICU Level of Service				C			
Analysis Period (min)	15											

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

3: Kroger & South Main

4/20/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓		↑	↓		↑	↑↓		↑	↑↓	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Fr _t	1.00	0.89		1.00	0.87		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	1648		1770	1626		1770	3472		1770	3490	
Flt Permitted	0.46	1.00		0.68	1.00		0.22	1.00		0.15	1.00	
Satd. Flow (perm)	842	1648		1258	1626		418	3472		277	3490	
Volume (vph)	34	28	80	111	30	163	105	1017	68	183	977	28
Peak-hour factor, PHF	0.89	0.85	0.85	0.85	0.85	0.85	0.88	0.95	0.89	0.88	0.95	0.88
Adj. Flow (vph)	38	33	94	131	35	192	119	1071	76	208	1028	32
RTOR Reduction (vph)	0	78	0	0	149	0	0	7	0	0	3	0
Lane Group Flow (vph)	38	49	0	131	78	0	119	1140	0	208	1057	0
Heavy Vehicles (%)	3%	4%	2%	2%	2%	2%	2%	3%	2%	2%	3%	2%
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	9.2	9.2		9.2	9.2		30.0	27.0		34.6	29.3	
Effective Green, g (s)	9.2	9.2		9.2	9.2		30.0	27.0		34.6	29.3	
Actuated g/C Ratio	0.17	0.17		0.17	0.17		0.56	0.50		0.65	0.55	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	145	283		216	280		310	1752		327	1911	
v/s Ratio Prot		0.03			0.05		0.02	0.33		c0.06	0.30	
v/s Ratio Perm	0.05			c0.10			0.19			c0.35		
v/c Ratio	0.26	0.17		0.61	0.28		0.38	0.65		0.64	0.55	
Uniform Delay, d1	19.2	18.9		20.5	19.3		5.8	9.8		6.1	7.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	0.3		4.8	0.5		0.8	0.9		4.0	0.3	
Delay (s)	20.2	19.2		25.2	19.8		6.6	10.6		10.1	8.2	
Level of Service	C	B		C	B		A	B		B	A	
Approach Delay (s)		19.4			21.8			10.3			8.5	
Approach LOS		B			C			B			A	
Intersection Summary												
HCM Average Control Delay		11.4			HCM Level of Service			B				
HCM Volume to Capacity ratio		0.66										
Actuated Cycle Length (s)		53.5			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		68.7%			ICU Level of Service			C				
Analysis Period (min)		15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

8: Ellett & South Main

4/20/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓			↑	↑	↑	↑	↑	↑	↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Fr _t	1.00	0.90			1.00	0.85	1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00			0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1675			1804	1583	1770	3495		1770	3523	
Flt Permitted	0.59	1.00			0.62	1.00	0.21	1.00		0.14	1.00	
Satd. Flow (perm)	1106	1675			1157	1583	383	3495		270	3523	
Volume (vph)	59	45	93	85	46	127	109	984	89	138	1033	31
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.92	0.88	0.88	0.88	0.88	0.96	0.91
Adj. Flow (vph)	69	53	109	100	54	138	124	1118	101	157	1076	34
RTOR Reduction (vph)	0	89	0	0	0	113	0	9	0	0	3	0
Lane Group Flow (vph)	69	73	0	0	154	25	124	1210	0	157	1107	0
Turn Type	Perm		Perm		Perm	pm+pt			pm+pt			
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		8		8	2			6			
Actuated Green, G (s)	12.2	12.2			12.2	12.2	41.7	37.7		45.7	39.7	
Effective Green, g (s)	12.2	12.2			12.2	12.2	41.7	37.7		45.7	39.7	
Actuated g/C Ratio	0.18	0.18			0.18	0.18	0.61	0.56		0.67	0.58	
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	199	301			208	284	317	1941		314	2060	
v/s Ratio Prot	0.04						0.02	c0.35		c0.04	0.31	
v/s Ratio Perm	0.06				c0.13	0.02	0.22			0.29		
v/c Ratio	0.35	0.24			0.74	0.09	0.39	0.62		0.50	0.54	
Uniform Delay, d1	24.4	23.9			26.4	23.2	6.0	10.3		6.5	8.5	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.1	0.4			13.2	0.1	0.8	0.6		1.3	0.3	
Delay (s)	25.4	24.3			39.6	23.3	6.8	10.9		7.8	8.8	
Level of Service	C	C			D	C	A	B		A	A	
Approach Delay (s)	24.6				31.9			10.5		8.7		
Approach LOS	C				C			B		A		
Intersection Summary												
HCM Average Control Delay	12.8				HCM Level of Service			B				
HCM Volume to Capacity ratio	0.68											
Actuated Cycle Length (s)	67.9				Sum of lost time (s)			16.0				
Intersection Capacity Utilization	66.2%				ICU Level of Service			C				
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

4: Main Entrance & South Main

4/20/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓			↔		↑	↑↓		↑	↑↓	↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	1.00
Fr _t	1.00	0.88			0.92		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1641			1694		1770	3497		1770	3539	1583
Flt Permitted	0.86	1.00			0.95		0.15	1.00		0.17	1.00	1.00
Satd. Flow (perm)	1609	1641			1628		278	3497		325	3539	1583
Volume (vph)	162	14	56	9	14	37	142	1109	19	27	1096	72
Peak-hour factor, PHF	0.90	0.90	0.90	0.85	0.85	0.85	0.92	0.89	0.90	0.88	0.94	0.94
Adj. Flow (vph)	180	16	62	11	16	44	154	1246	21	31	1166	77
RTOR Reduction (vph)	0	51	0	0	36	0	0	2	0	0	0	36
Lane Group Flow (vph)	180	27	0	0	35	0	154	1265	0	31	1166	41
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%
Turn Type	Perm		Perm			pm+pt		pm+pt		Perm		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		8				2			6		6
Actuated Green, G (s)	10.0	10.0			10.0		39.5	34.6		32.7	31.2	31.2
Effective Green, g (s)	10.0	10.0			10.0		39.5	34.6		32.7	31.2	31.2
Actuated g/C Ratio	0.17	0.17			0.17		0.68	0.60		0.56	0.54	0.54
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	277	282			280		315	2083		220	1900	850
v/s Ratio Prot		0.02				c0.04	c0.36		0.00	0.33		
v/s Ratio Perm	c0.11				0.02		0.29			0.08		0.03
v/c Ratio	0.65	0.09			0.12		0.49	0.61		0.14	0.61	0.05
Uniform Delay, d1	22.4	20.2			20.3		5.6	7.4		6.0	9.3	6.4
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.2	0.1			0.2		1.2	0.5		0.3	0.6	0.0
Delay (s)	27.6	20.4			20.5		6.8	8.0		6.3	9.9	6.4
Level of Service	C	C			C		A	A		A	A	A
Approach Delay (s)		25.4			20.5			7.8			9.6	
Approach LOS		C			C		A			A		
Intersection Summary												
HCM Average Control Delay		10.4			HCM Level of Service		B					
HCM Volume to Capacity ratio		0.64										
Actuated Cycle Length (s)		58.1			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		63.8%			ICU Level of Service		B					
Analysis Period (min)		15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

6: Secondary Entrance & South Main

4/20/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓			↔		↑	↑↓		↑	↑↓	↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	1.00
Fr _t	1.00	0.88			0.93		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00			0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1630			1639		1770	3514		1770	3539	1583
Flt Permitted	0.71	1.00			0.86		0.25	1.00		0.22	1.00	1.00
Satd. Flow (perm)	1323	1630			1437		474	3514		404	3539	1583
Volume (vph)	148	14	71	39	14	49	91	902	43	61	857	94
Peak-hour factor, PHF	0.90	0.90	0.90	0.85	0.85	0.85	0.88	0.92	0.88	0.88	0.96	0.96
Adj. Flow (vph)	164	16	79	46	16	58	103	980	49	69	893	98
RTOR Reduction (vph)	0	63	0	0	46	0	0	5	0	0	0	46
Lane Group Flow (vph)	164	32	0	0	74	0	103	1024	0	69	893	52
Heavy Vehicles (%)	2%	2%	2%	2%	2%	11%	2%	2%	2%	2%	2%	2%
Turn Type	Perm			Perm			pm+pt		pm+pt		Perm	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	12.5	12.5			12.5		36.5	32.9		35.1	32.2	32.2
Effective Green, g (s)	12.5	12.5			12.5		36.5	32.9		35.1	32.2	32.2
Actuated g/C Ratio	0.21	0.21			0.21		0.61	0.55		0.58	0.53	0.53
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	274	338			298		364	1917		301	1890	845
v/s Ratio Prot		0.02					c0.02	c0.29		0.01	0.25	
v/s Ratio Perm	c0.12				0.05		0.15			0.12		0.03
v/c Ratio	0.60	0.10			0.25		0.28	0.53		0.23	0.47	0.06
Uniform Delay, d1	21.6	19.3			20.0		5.4	8.8		6.0	8.8	6.8
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.01	1.01	1.02
Incremental Delay, d2	3.5	0.1			0.4		0.4	0.3		0.4	0.2	0.0
Delay (s)	25.1	19.5			20.4		5.9	9.1		6.4	9.0	6.9
Level of Service	C	B			C		A	A		A	A	A
Approach Delay (s)		23.0			20.4			8.8			8.6	
Approach LOS		C			C		A			A		
Intersection Summary												
HCM Average Control Delay		10.7			HCM Level of Service			B				
HCM Volume to Capacity ratio		0.50										
Actuated Cycle Length (s)		60.3			Sum of lost time (s)			8.0				
Intersection Capacity Utilization		54.5%			ICU Level of Service			A				
Analysis Period (min)		15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

2: Country Club & South Main

4/20/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Fr _t	1.00	0.85	1.00	0.92			1.00	0.99		1.00	1.00	0.85
Flt Protected	0.97	1.00	0.95	1.00			0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1802	1583	1770	1714			1770	3505		1770	3539	1583
Flt Permitted	0.72	1.00	0.32	1.00			0.14	1.00		0.15	1.00	1.00
Satd. Flow (perm)	1341	1583	605	1714			263	3505		278	3539	1583
Volume (vph)	232	107	149	68	52	59	150	1167	74	47	1136	224
Peak-hour factor, PHF	0.90	0.85	0.85	0.85	0.85	0.85	0.88	0.97	0.88	0.88	0.88	0.90
Adj. Flow (vph)	258	126	175	80	61	69	170	1203	84	53	1291	249
RTOR Reduction (vph)	0	0	106	0	48	0	0	8	0	0	0	106
Lane Group Flow (vph)	0	384	69	80	82	0	170	1279	0	53	1291	143
Turn Type	Perm		Perm	Perm			pm+pt			pm+pt		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)	19.2	19.2	19.2	19.2			32.0	28.3		29.0	26.8	26.8
Effective Green, g (s)	19.2	19.2	19.2	19.2			32.0	28.3		29.0	26.8	26.8
Actuated g/C Ratio	0.31	0.31	0.31	0.31			0.52	0.46		0.47	0.43	0.43
Clearance Time (s)	4.0	4.0	4.0	4.0			4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0			3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	417	493	188	533			227	1608		184	1537	688
v/s Ratio Prot				0.05			c0.04	c0.37		0.01	0.36	
v/s Ratio Perm	c0.29	0.04	0.13				0.34			0.13		0.09
v/c Ratio	0.92	0.14	0.43	0.15			0.75	0.80		0.29	0.84	0.21
Uniform Delay, d1	20.5	15.3	16.9	15.4			11.5	14.2		10.8	15.5	10.8
Progression Factor	1.00	1.00	1.00	1.00			1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	25.5	0.1	1.6	0.1			12.7	2.8		0.9	4.2	0.2
Delay (s)	46.0	15.4	18.4	15.5			24.2	17.1		11.7	19.8	11.0
Level of Service	D	B	B	B			C	B		B	B	B
Approach Delay (s)	36.5				16.6			17.9			18.1	
Approach LOS	D				B			B			B	
Intersection Summary												
HCM Average Control Delay	20.6				HCM Level of Service				C			
HCM Volume to Capacity ratio	0.80											
Actuated Cycle Length (s)	61.7				Sum of lost time (s)			8.0				
Intersection Capacity Utilization	74.9%				ICU Level of Service			D				
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: Kroger & South Main

4/20/2007

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓		↑	↓		↑	↑↓		↑	↑↓	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Fr _t	1.00	0.88		1.00	0.87		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1633		1770	1620		1770	3524		1770	3525	
Flt Permitted	0.58	1.00		0.61	1.00		0.13	1.00		0.12	1.00	
Satd. Flow (perm)	1077	1633		1141	1620		234	3524		222	3525	
Volume (vph)	45	22	103	86	18	117	128	1170	35	147	1192	33
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	53	26	121	101	21	138	145	1330	40	167	1355	38
RTOR Reduction (vph)	0	102	0	0	116	0	0	3	0	0	2	0
Lane Group Flow (vph)	53	45	0	101	43	0	145	1367	0	167	1391	0
Turn Type	Perm		Perm			pm+pt			pm+pt			
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	10.3	10.3		10.3	10.3		40.9	37.1		42.9	38.1	
Effective Green, g (s)	10.3	10.3		10.3	10.3		40.9	37.1		42.9	38.1	
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.64	0.58		0.67	0.59	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	173	262		183	260		240	2036		264	2092	
v/s Ratio Prot	0.03			0.03			0.04	0.39		c0.05	c0.39	
v/s Ratio Perm	0.05		c0.09			0.35			0.37			
v/c Ratio	0.31	0.17		0.55	0.17		0.60	0.67		0.63	0.66	
Uniform Delay, d ₁	23.8	23.3		24.8	23.2		6.8	9.3		7.2	8.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d ₂	1.0	0.3		3.6	0.3		4.2	0.9		4.9	0.8	
Delay (s)	24.8	23.6		28.4	23.5		11.0	10.2		12.0	9.6	
Level of Service	C	C		C	C		B	B		B	A	
Approach Delay (s)		23.9			25.4			10.3			9.8	
Approach LOS		C			C			B			A	
Intersection Summary												
HCM Average Control Delay	12.0		HCM Level of Service			B						
HCM Volume to Capacity ratio	0.61											
Actuated Cycle Length (s)	64.2		Sum of lost time (s)			8.0						
Intersection Capacity Utilization	67.2%		ICU Level of Service			C						
Analysis Period (min)	15											
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

8: Ellett & South Main

4/20/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓			↑	↑	↑	↑	↑	↑	↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Fr _t	1.00	0.91			1.00	0.85	1.00	0.98		1.00	1.00	
Flt Protected	0.95	1.00			0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1687			1807	1583	1770	3475		1770	3529	
Flt Permitted	0.57	1.00			0.47	1.00	0.15	1.00		0.10	1.00	
Satd. Flow (perm)	1064	1687			873	1583	288	3475		195	3529	
Volume (vph)	60	78	132	91	56	197	137	1160	158	218	1083	22
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.91	0.88	0.89	0.88	0.88	0.88	0.88
Adj. Flow (vph)	71	92	155	107	66	216	156	1303	180	248	1231	25
RTOR Reduction (vph)	0	83	0	0	0	139	0	14	0	0	2	0
Lane Group Flow (vph)	71	164	0	0	173	77	156	1469	0	248	1254	0
Turn Type	Perm		Perm		Perm	pm+pt			pm+pt			
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		8		8	2			6			
Actuated Green, G (s)	15.6	15.6			15.6	15.6	38.8	34.3		47.0	38.5	
Effective Green, g (s)	15.6	15.6			15.6	15.6	38.8	34.3		47.0	38.5	
Actuated g/C Ratio	0.22	0.22			0.22	0.22	0.55	0.49		0.67	0.55	
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	235	373			193	350	253	1688		324	1924	
v/s Ratio Prot	0.10						0.04	c0.42		c0.09	0.36	
v/s Ratio Perm	0.07				c0.20	0.05	0.30			0.42		
v/c Ratio	0.30	0.44			0.90	0.22	0.62	0.87		0.77	0.65	
Uniform Delay, d1	23.0	23.7			26.7	22.5	9.1	16.2		16.0	11.3	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	0.8			37.0	0.3	4.4	5.2		10.3	0.8	
Delay (s)	23.7	24.6			63.8	22.8	13.5	21.4		26.3	12.1	
Level of Service	C	C			E	C	B	C		C	B	
Approach Delay (s)		24.4			41.0			20.6			14.5	
Approach LOS		C			D			C			B	
Intersection Summary												
HCM Average Control Delay		20.6			HCM Level of Service			C				
HCM Volume to Capacity ratio		0.86										
Actuated Cycle Length (s)		70.6			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		82.7%			ICU Level of Service			E				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

4: Main Entrance & South Main

4/20/2007

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓			↔		↑	↑↓		↑	↑↓	↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	1.00
Fr _t	1.00	0.88			0.93		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1640			1715		1770	3528		1770	3539	1583
Flt Permitted	0.82	1.00			0.94		0.12	1.00		0.14	1.00	1.00
Satd. Flow (perm)	1523	1640			1621		229	3528		261	3539	1583
Volume (vph)	194	17	67	15	18	34	188	1258	28	34	1206	92
Peak-hour factor, PHF	0.90	0.90	0.90	0.88	0.85	0.85	0.88	0.88	0.88	0.88	0.89	0.89
Adj. Flow (vph)	216	19	74	17	21	40	214	1430	32	39	1355	103
RTOR Reduction (vph)	0	58	0	0	32	0	0	2	0	0	0	53
Lane Group Flow (vph)	216	35	0	0	46	0	214	1460	0	39	1355	50
Turn Type	Perm			Perm			pm+pt			pm+pt		Perm
Protected Phases		4				8		5	2		1	6
Permitted Phases	4				8			2			6	6
Actuated Green, G (s)	12.5	12.5			12.5		38.6	33.1		30.1	28.6	28.6
Effective Green, g (s)	12.5	12.5			12.5		38.6	33.1		30.1	28.6	28.6
Actuated g/C Ratio	0.21	0.21			0.21		0.65	0.56		0.51	0.48	0.48
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	322	347			343		306	1976		171	1713	766
v/s Ratio Prot		0.02					c0.07	c0.41		0.01	0.38	
v/s Ratio Perm	c0.14				0.03		0.39			0.11		0.03
v/c Ratio	0.67	0.10			0.14		0.70	0.74		0.23	0.79	0.07
Uniform Delay, d ₁	21.4	18.8			18.9		9.4	9.8		8.4	12.8	8.1
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d ₂	5.4	0.1			0.2		6.8	1.5		0.7	2.6	0.0
Delay (s)	26.8	18.9			19.1		16.2	11.2		9.1	15.3	8.2
Level of Service	C	B			B		B	B		A	B	A
Approach Delay (s)		24.4			19.1			11.9			14.7	
Approach LOS		C			B			B			B	
Intersection Summary												
HCM Average Control Delay		14.3			HCM Level of Service			B				
HCM Volume to Capacity ratio		0.70										
Actuated Cycle Length (s)		59.1			Sum of lost time (s)			8.0				
Intersection Capacity Utilization		71.2%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

6: Secondary Entrance & South Main

4/20/2007



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑ ↗	↑ ↘			↗ ↖		↑ ↗	↑ ↖		↑ ↗	↑ ↖	↑ ↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	1.00
Fr _t	1.00	0.88			0.94		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00			0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1631			1711		1770	3501		1770	3539	1583
Flt Permitted	0.69	1.00			0.85		0.18	1.00		0.15	1.00	1.00
Satd. Flow (perm)	1279	1631			1489		341	3501		272	3539	1583
Volume (vph)	177	17	84	41	18	54	120	1001	78	106	995	120
Peak-hour factor, PHF	0.90	0.90	0.90	0.85	0.85	0.85	0.93	0.88	0.88	0.88	0.90	0.90
Adj. Flow (vph)	197	19	93	48	21	64	129	1138	89	120	1106	133
RTOR Reduction (vph)	0	75	0	0	52	0	0	8	0	0	0	58
Lane Group Flow (vph)	197	37	0	0	81	0	129	1219	0	120	1106	75
Turn Type	Perm			Perm			pm+pt			pm+pt		Perm
Protected Phases		4				8		5	2		1	6
Permitted Phases	4			8				2			6	6
Actuated Green, G (s)	11.2	11.2			11.2		35.1	31.1		35.1	31.1	31.1
Effective Green, g (s)	11.2	11.2			11.2		35.1	31.1		35.1	31.1	31.1
Actuated g/C Ratio	0.19	0.19			0.19		0.60	0.53		0.60	0.53	0.53
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	246	313			286		303	1868		267	1888	844
v/s Ratio Prot		0.02					0.03	c0.35		c0.03	0.31	
v/s Ratio Perm	c0.15				0.05		0.23			0.24		0.05
v/c Ratio	0.80	0.12			0.28		0.43	0.65		0.45	0.59	0.09
Uniform Delay, d1	22.5	19.5			20.1		5.9	9.7		6.5	9.2	6.7
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.01	1.00	1.01
Incremental Delay, d2	16.8	0.2			0.5		1.0	0.8		1.2	0.5	0.0
Delay (s)	39.3	19.6			20.7		6.9	10.6		7.7	9.7	6.8
Level of Service	D	B			C		A	B		A	A	A
Approach Delay (s)		32.2			20.7			10.2			9.3	
Approach LOS		C			C			B			A	
Intersection Summary												
HCM Average Control Delay		12.4			HCM Level of Service			B				
HCM Volume to Capacity ratio		0.67										
Actuated Cycle Length (s)		58.3			Sum of lost time (s)			12.0				
Intersection Capacity Utilization		62.5%			ICU Level of Service			B				
Analysis Period (min)		15										
c Critical Lane Group												

Appendix C

VDOT Historical Traffic Information

Virginia Department of Transportation
Traffic Engineering Division
2001

Annual Average Daily Traffic Volume Estimates By Section of Route
Montgomery Maintenance Area

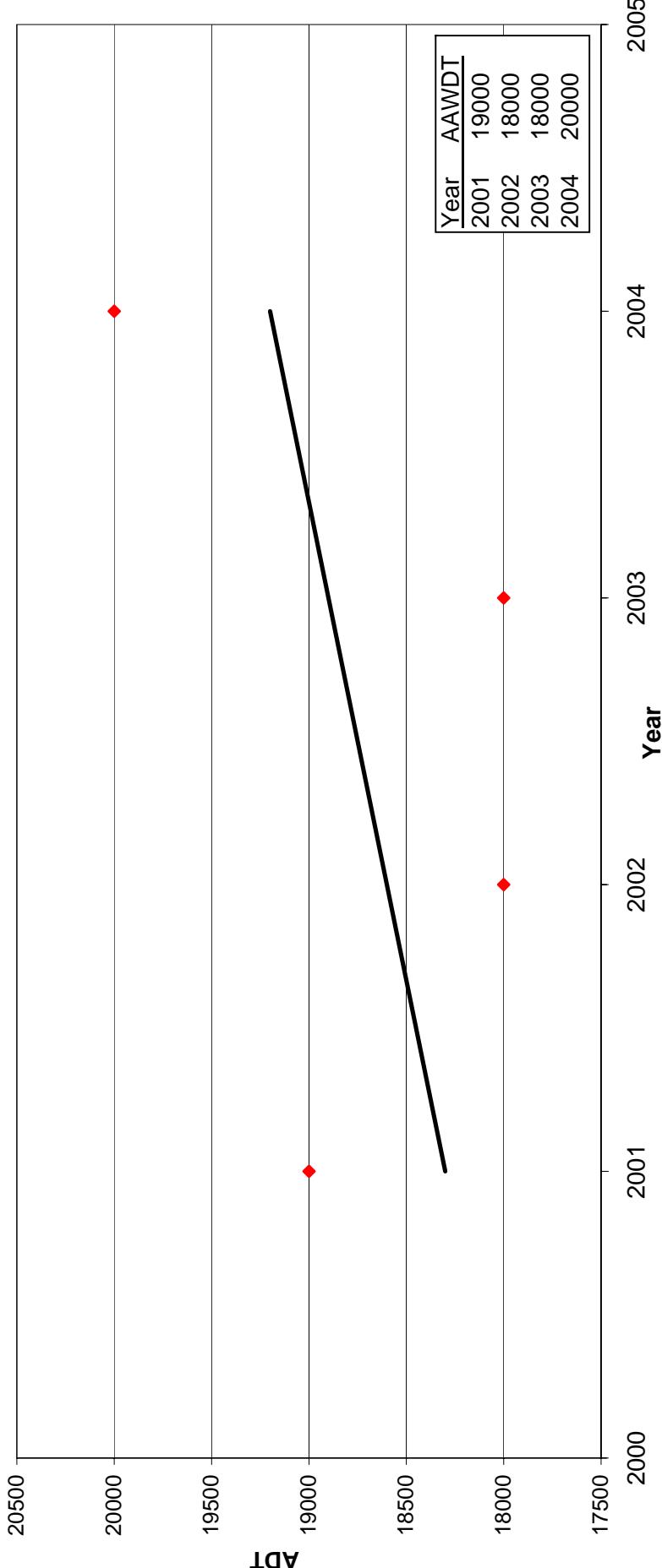
Route	Length	AADT	QA	4Tire	Bus	Truck				QC	Design Hour	QK	AAWDT	QW	Year
						2Axle	3+Axle	1Trail	2Trail						
Montgomery County															
 11	5.11	8000	F	95%	0%	2%	1%	1%	0%	F	720	F	8100	F	2001
 11	3.21	8100	F	95%	0%	2%	1%	1%	0%	F	800	F	8200	F	2001
 11	2.43	8500	F	95%	0%	2%	1%	1%	0%	C	880	F	8600	F	2001
Town of Christiansburg															
Bus 	0.18	33000	F	96%	0%	2%	1%	1%	0%	F	3100	F	34000	F	2001
Bus  N Franklin St	0.11	33000	F	96%	0%	2%	1%	1%	0%	F	3100	F	34000	F	2001
Bus  N Franklin St	1.38	28000	F	96%	0%	2%	1%	1%	0%	C	2500	F	29000	F	2001
Bus  N Franklin St	0.28	12000	F	96%	0%	2%	1%	1%	0%	F	1100	F	12000	F	2001
Bus  11 E Main St	0.12	8500	F	97%	0%	2%	0%	1%	0%	F	840	F	8900	F	2001
Bus  11 Roanoke St	0.11	13000	F	97%	0%	2%	0%	1%	0%	F	1300	F	13000	F	2001
Bus  11 Roanoke St	0.98	13000	F	97%	0%	2%	0%	1%	0%	F	1300	F	13000	F	2001
Bus  11 Roanoke St	0.90	16000	F	95%	0%	2%	1%	1%	0%	C	1100	F	17000	F	2001
Town of Blacksburg															
Bus  Main St	2.32	7000	F	97%	1%	1%	0%	0%	0%	C	710	F	7300	F	2001
Bus  Main St	0.26	16000	F	97%	1%	1%	0%	0%	0%	F	1500	F	17000	F	2001
Bus  Main St	0.17	18000	F	97%	1%	1%	0%	0%	0%	F	1600	F	19000	F	2001
Bus  Main St	0.53	20000	F	97%	1%	1%	0%	0%	0%	F	1700	F	21000	F	2001
Bus  Main St	0.19	17000	F	96%	0%	2%	1%	1%	0%	F	1300	F	17000	F	2001
Bus  Main St	0.53	18000	F	96%	0%	2%	1%	1%	0%	F	1600	F	19000	F	2001
Bus  Main St	1.00	18000	F	96%	0%	2%	1%	1%	0%	F	1600	F	19000	F	2001
Bus  Main St	1.25	16000	F	96%	0%	2%	1%	1%	0%	C	1500	F	17000	F	2001
Town of Christiansburg															
 04	0.04	NA											NA	NA	

Virginia Department of Transportation
Mobility Management Division

2004
Annual Average Daily Traffic Volume Estimates By Section of Route
Town of Blacksburg

Route	Jurisdiction	Length	AADT	QA	4Tire	Bus	2Axle	3+Axle	1Trail	2Trail	Truck	QC	K	QK	Dir Factor	AAWDT	QW
(412) Prices Fork Rd	Town of Blacksburg	From US 460	1.07	27000	F	98%	0%	1%	0%	0%	C	0.093	F	0.59	30000	F	
(412) Prices Fork Rd	Town of Blacksburg	To Toms Creek Rd	0.28	18000	F	98%	0%	1%	0%	1%	C	0.086	F	0.56	19000	F	
(460) Main St	Town of Blacksburg (Maint: 60)	From NCL Blacksburg	3.70	16000	F	94%	0%	1%	1%	4%	0%	C	0.083	F	0.569	17000	F
(460) Main St	Town of Blacksburg (Maint: 60)	To SR 412 Prices Fork Rd	2.97	33000	F	94%	0%	1%	1%	3%	0%	C	0.1	F	0.525	35000	F
(460) Main St	Town of Blacksburg (Maint: 60)	To BUS US 460	0.72	33000	F	90%	0%	1%	1%	7%	1%	F	0.094	F	0.616	34000	F
Bus (460) Main St	Town of Blacksburg	From US 460	1.01	4300	F	98%	0%	1%	1%	0%	0%	C	0.098	F	0.673	4700	F
Bus (460) Main St	Town of Blacksburg	To Mount Tabor Rd	0.87	7200	F	98%	0%	1%	0%	0%	0%	C	0.105	F	0.639	7900	F
Bus (460) Main St	Town of Blacksburg	From Patrick Henry Dr															
Bus (460) Main St	Town of Blacksburg	From Bruce Dr															
Bus (460) Main St	Town of Blacksburg	To Progress St	0.26	15000	F	98%	0%	1%	0%	0%	0%	F	0.093	F	0.596	13000	F
Bus (460) Main St	Town of Blacksburg	From Prices Fork Rd	0.17	17000	F	98%	1%	1%	0%	0%	0%	C	0.085	F	0.565	19000	F
Bus (460) Main St	Town of Blacksburg	To Roanoke St															
Bus (460) Main St	Town of Blacksburg	From Clay St	0.19	16000	F	98%	0%	1%	0%	0%	0%	F	0.086	F	0.575	18000	F
Bus (460) Main St	Town of Blacksburg	To Upland Rd	0.53	18000	F	98%	0%	1%	0%	0%	0%	F	0.087	F	0.516	20000	F
Bus (460) Main St	Town of Blacksburg	From Ellet Rd	1.00	18000	F	98%	0%	1%	0%	0%	0%	F	0.088	F	0.522	20000	F
Bus (460) Main St	Town of Blacksburg	To US 460, ECL Blacksburg	1.33	19000	F	98%	0%	1%	0%	0%	0%	C	0.092	F	0.510	21000	F

Historical Traffic Volumes South Main Street From Ellett Rd to Upland Rd



Note: * Data taken from VDOT annual traffic counts



Anderson & Associates,
Inc. Blacksburg, VA

Date:
20-Apr-07
JN:
22559.41
Scale:
NTS

First & Main, Blacksburg - Traffic Impact Study
Blacksburg, Virginia

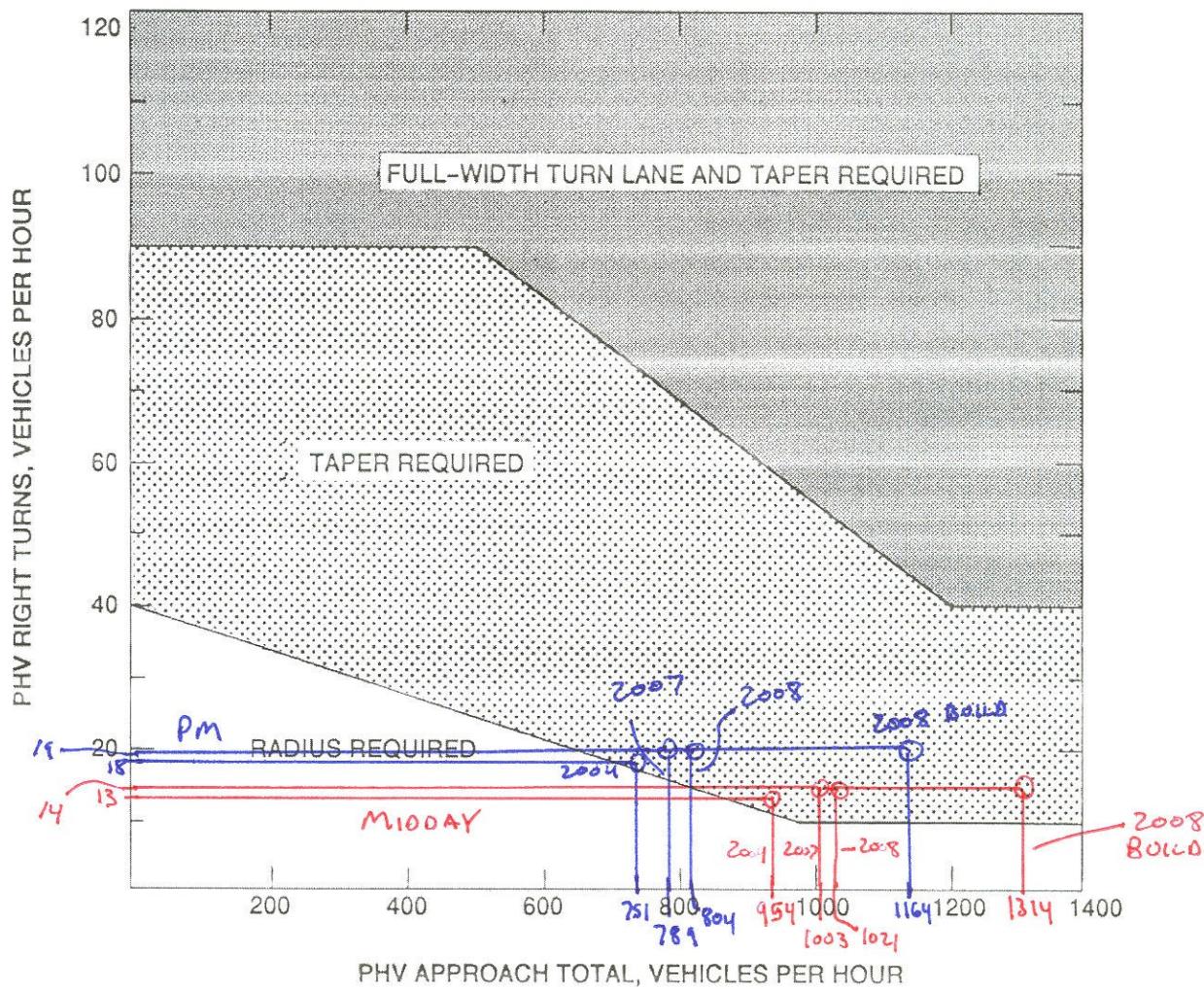
Figure 3: Historical Traffic Data

Appendix D

VDOT Turn Lane Warrants

LANSDOWNE ST. & SOUTH MAIN ST.

C-32



LEGEND

PHV - Peak Hour Volume (also Design Hourly Volume equivalent)

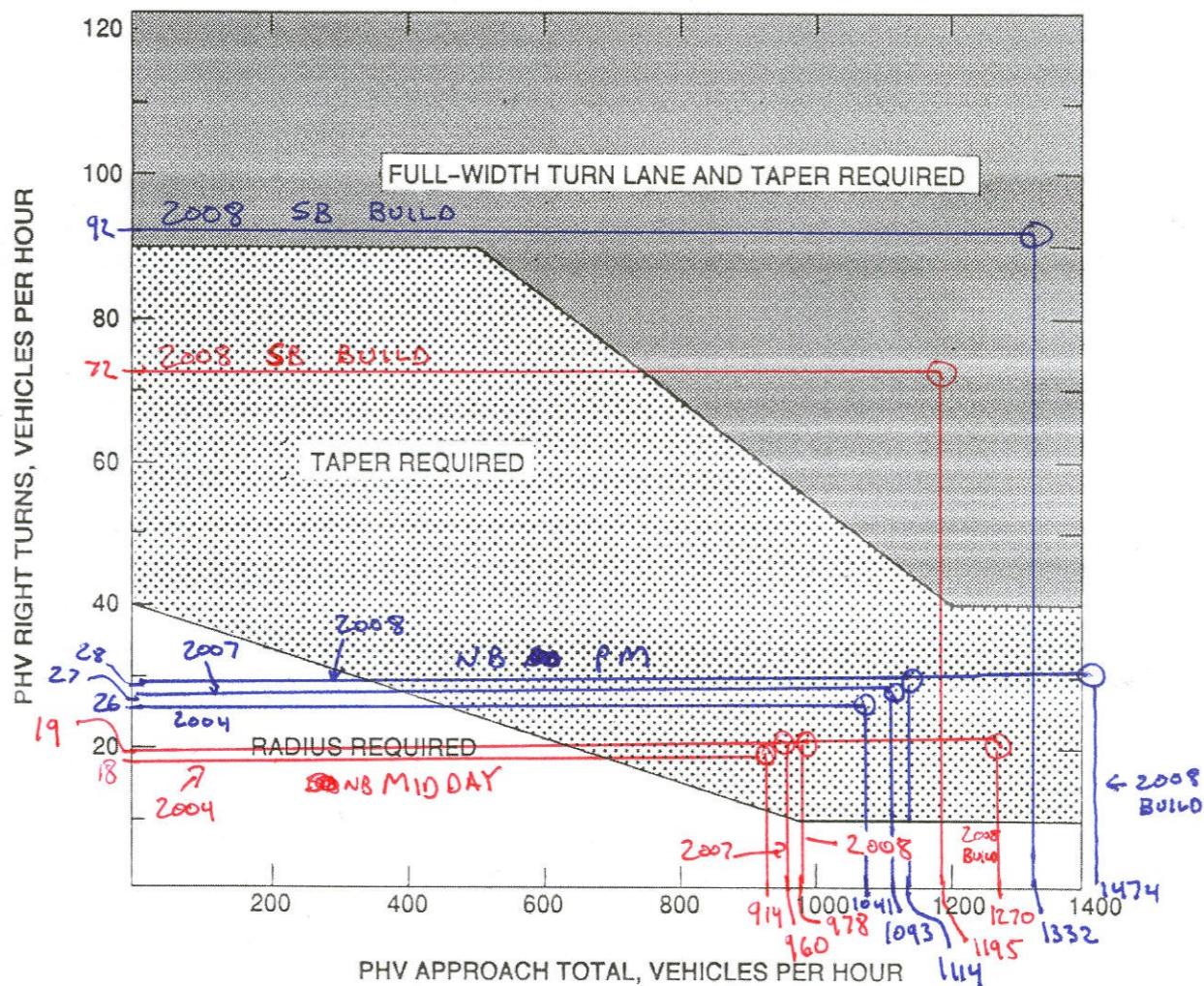
Adjustment for Right Turns

If PHV is not known use formula: $\text{PHV} = \text{ADT} \times K \times D$
 K = the percent of AADT occurring in the peak hour
 D = the percent of traffic in the peak direction of flow
 Note: An average of 11% for K x D will suffice.

FIGURE C-1-9 GUIDELINES FOR RIGHT TURN TREATMENT (4-LANE HIGHWAY)

ARDMORE ST. & SOUTH MAIN ST.

C-32



LEGEND

PHV - Peak Hour Volume (also Design Hourly Volume equivalent)

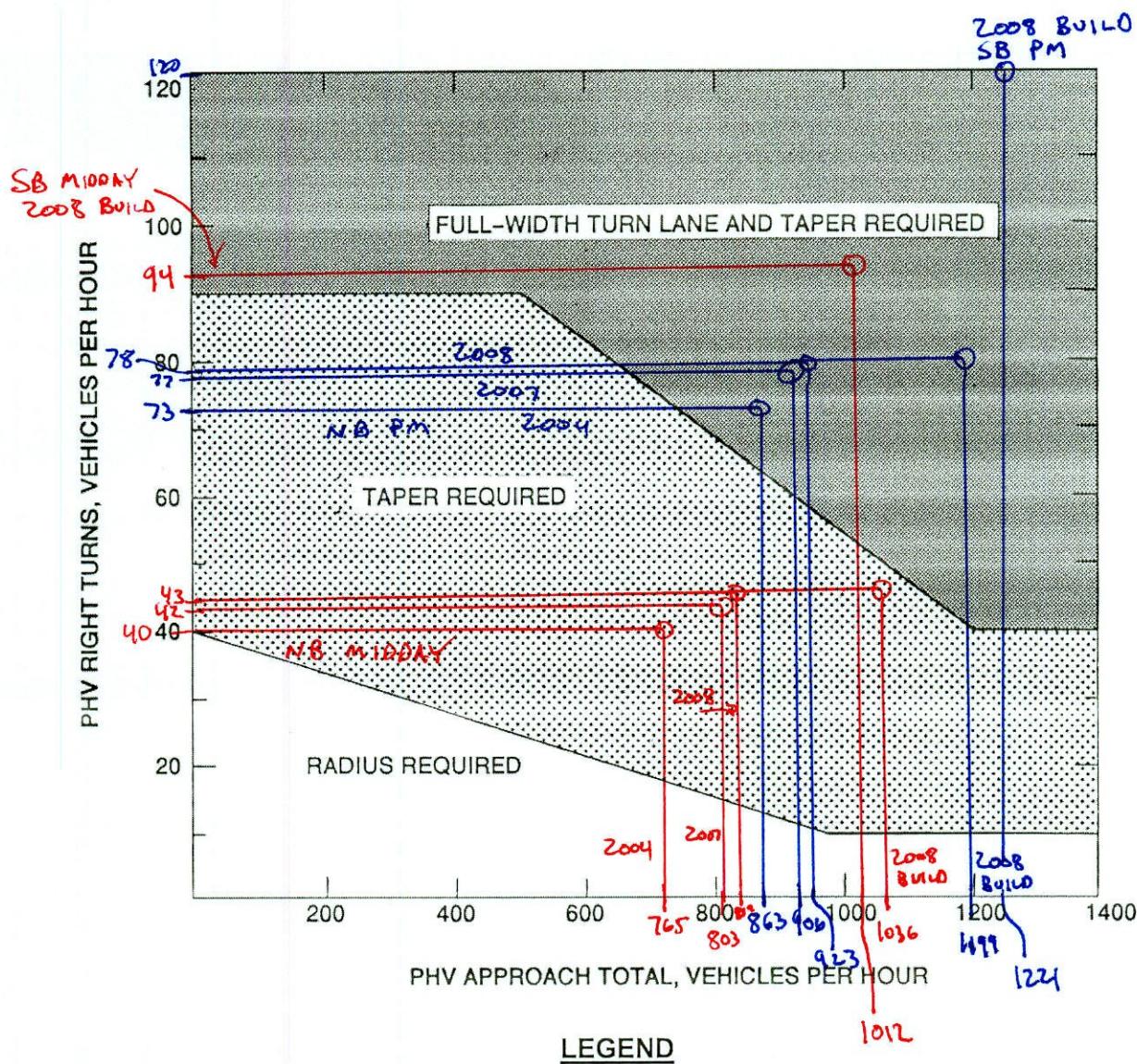
Adjustment for Right Turns

If PHV is not known use formula: $\text{PHV} = \text{ADT} \times K \times D$
 K = the percent of AADT occurring in the peak hour
 D = the percent of traffic in the peak direction of flow
 Note: An average of 11% for K x D will suffice.

FIGURE C-1-9 GUIDELINES FOR RIGHT TURN TREATMENT (4-LANE HIGHWAY)

MARLINGTON ST. & SOUTH MAIN ST.

C-32



PHV - Peak Hour Volume (also Design Hourly Volume equivalent)

Adjustment for Right Turns

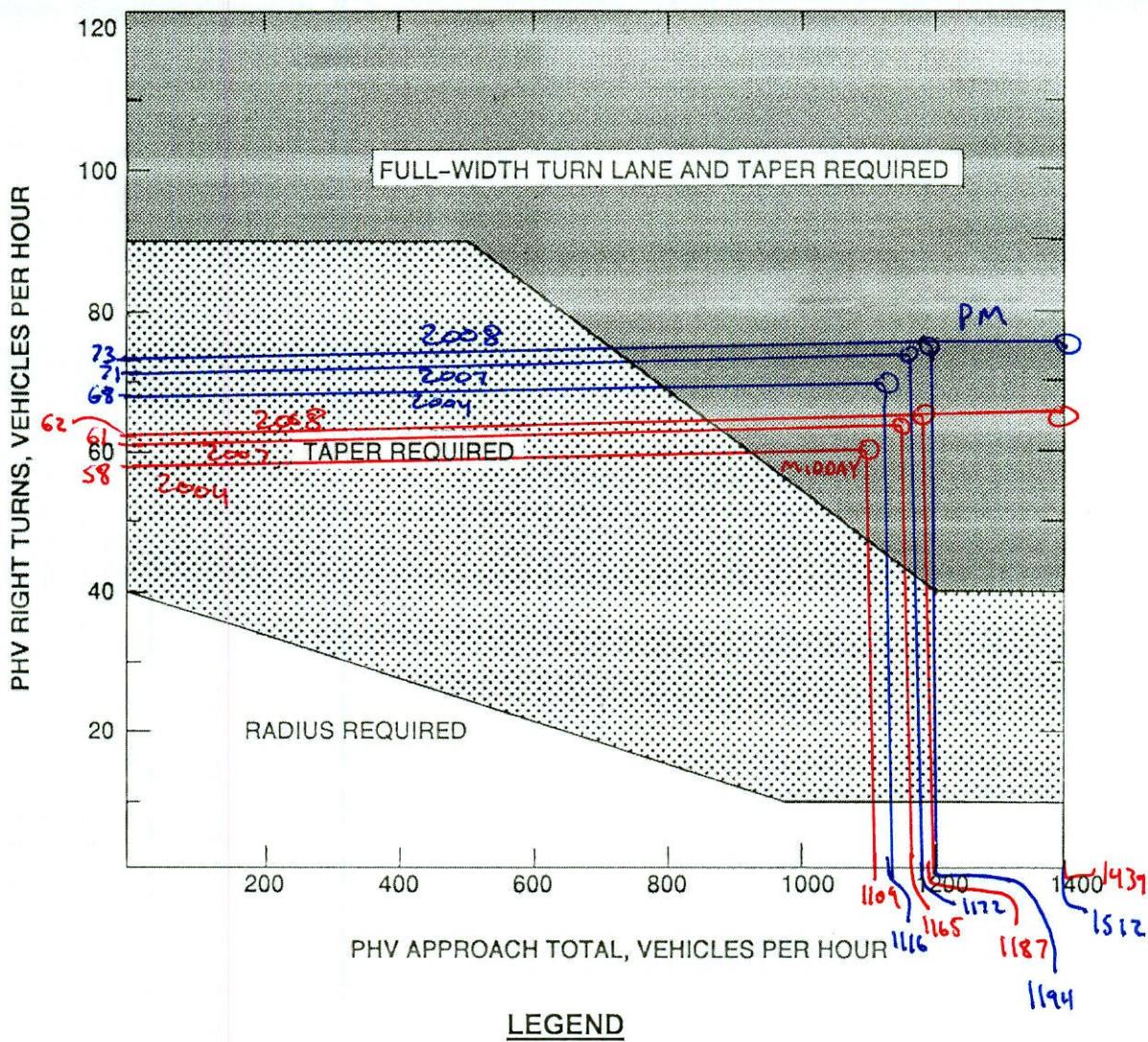
If PHV is not known use formula: $\text{PHV} = \text{ADT} \times K \times D$
 K = the percent of AADT occurring in the peak hour
 D = the percent of traffic in the peak direction of flow
 Note: An average of 11% for K x D will suffice.

FIGURE C-1-9 GUIDELINES FOR RIGHT TURN TREATMENT (4-LANE HIGHWAY)

KING ST./WENDY'S & SOUTH MAIN ST.

C-32

NB INTO WENDY'S



Adjustment for Right Turns

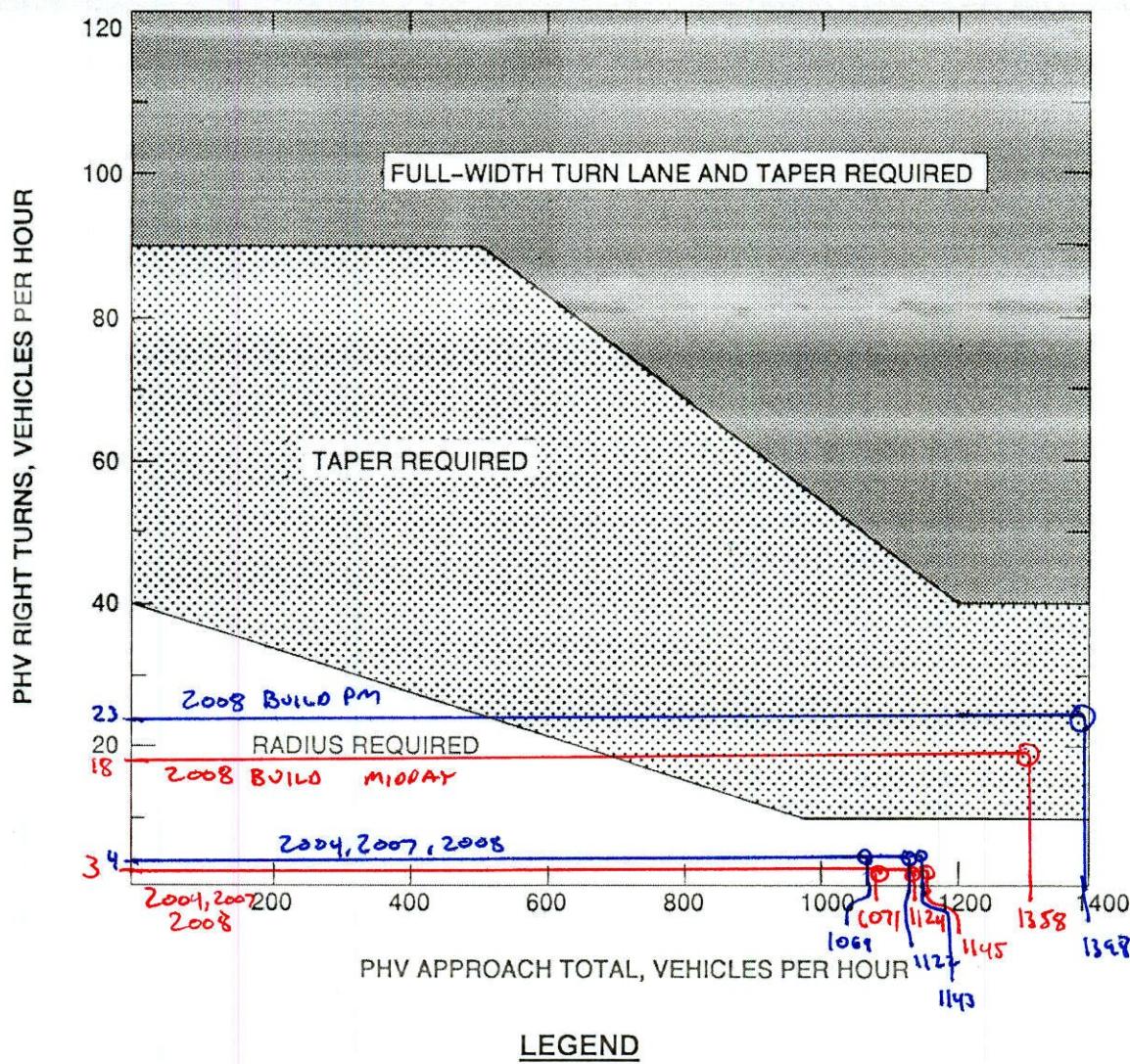
If PHV is not known use formula: $\text{PHV} = \text{ADT} \times K \times D$
 K = the percent of AADT occurring in the peak hour
 D = the percent of traffic in the peak direction of flow
 Note: An average of 11% for K x D will suffice.

FIGURE C-1-9 GUIDELINES FOR RIGHT TURN TREATMENT (4-LANE HIGHWAY)

KING ST. / WENDY'S & SOUTH MAIN ST.

C-32

SB ONTO KING ST.



PHV - Peak Hour Volume (also Design Hourly Volume equivalent)

Adjustment for Right Turns

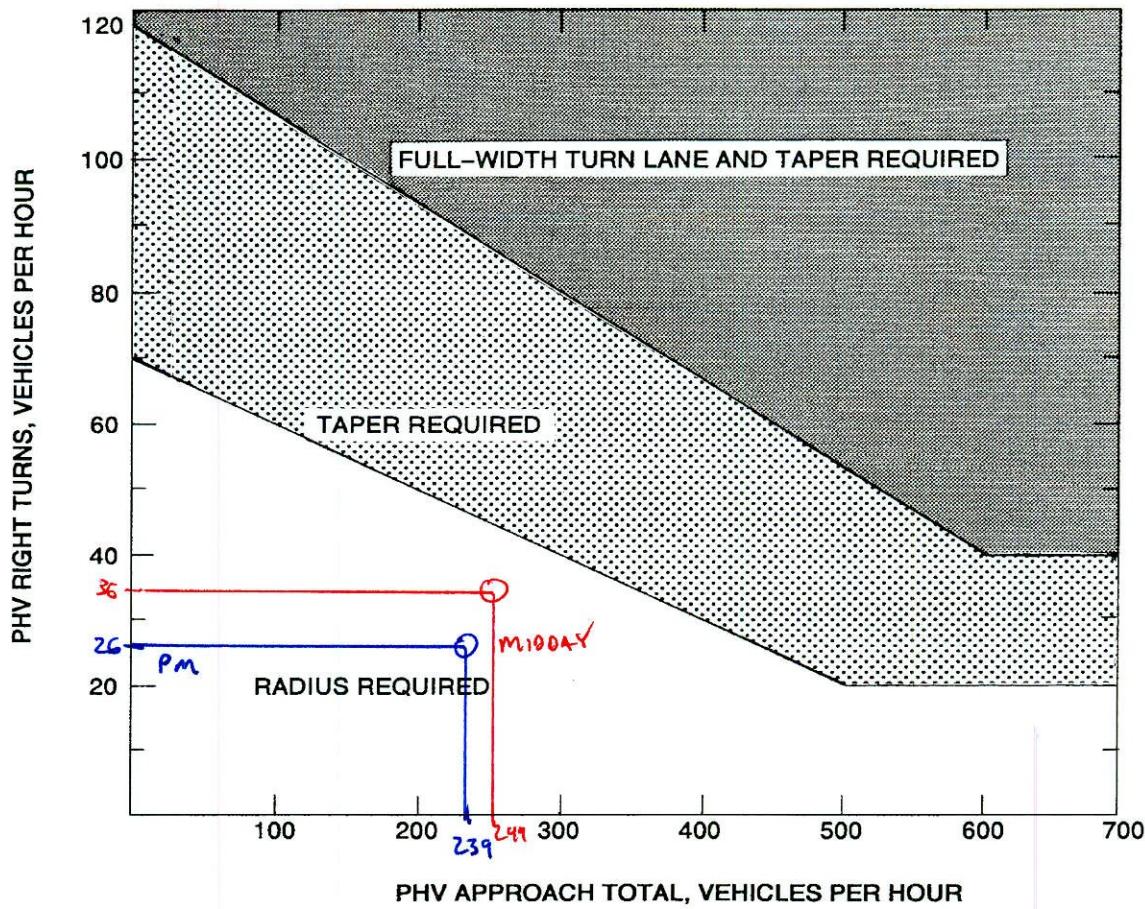
If PHV is not known use formula: $PHV = ADT \times K \times D$
 K = the percent of AADT occurring in the peak hour
 D = the percent of traffic in the peak direction of flow
 Note: An average of 11% for K x D will suffice.

FIGURE C-1-9 GUIDELINES FOR RIGHT TURN TREATMENT (4-LANE HIGHWAY)

SITE ENTRANCE & COUNTRY CLUB DR.

2008 BUILD

C-31



LEGEND

PHV - Peak Hour Volume (also Design Hourly Volume equivalent)

Adjustment for Right Turns

For posted speeds at or under 70 km/h (45 mph), PHV right turns > 40, and PHV total < 300. ← PM QUALIFIES FOR ADJUST.

Adjusted right turns - PHV Right Turns - 20

If PHV is not known use formula: PHV = ADT x K x D

TURN = 46 - 20 = 26

K = the percent of AADT occurring in the peak hour

D = the percent of traffic in the peak direction of flow

Note: An average of 11% for K x D will suffice.

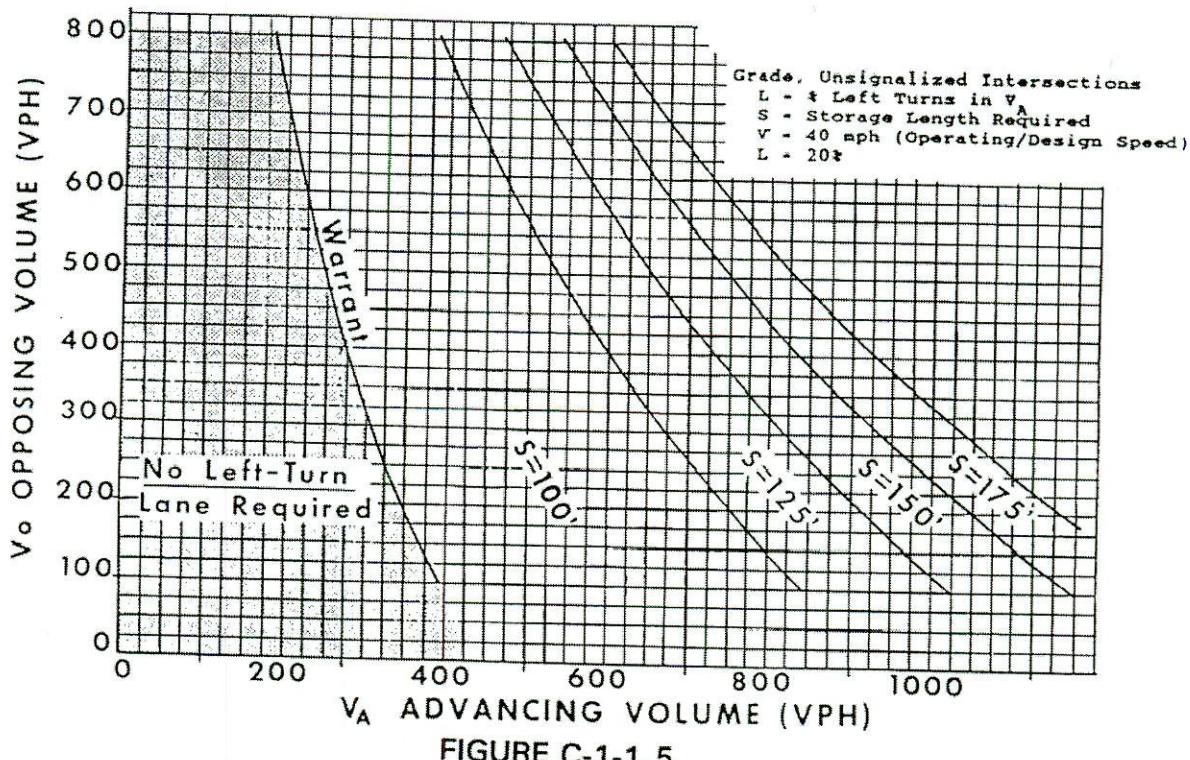
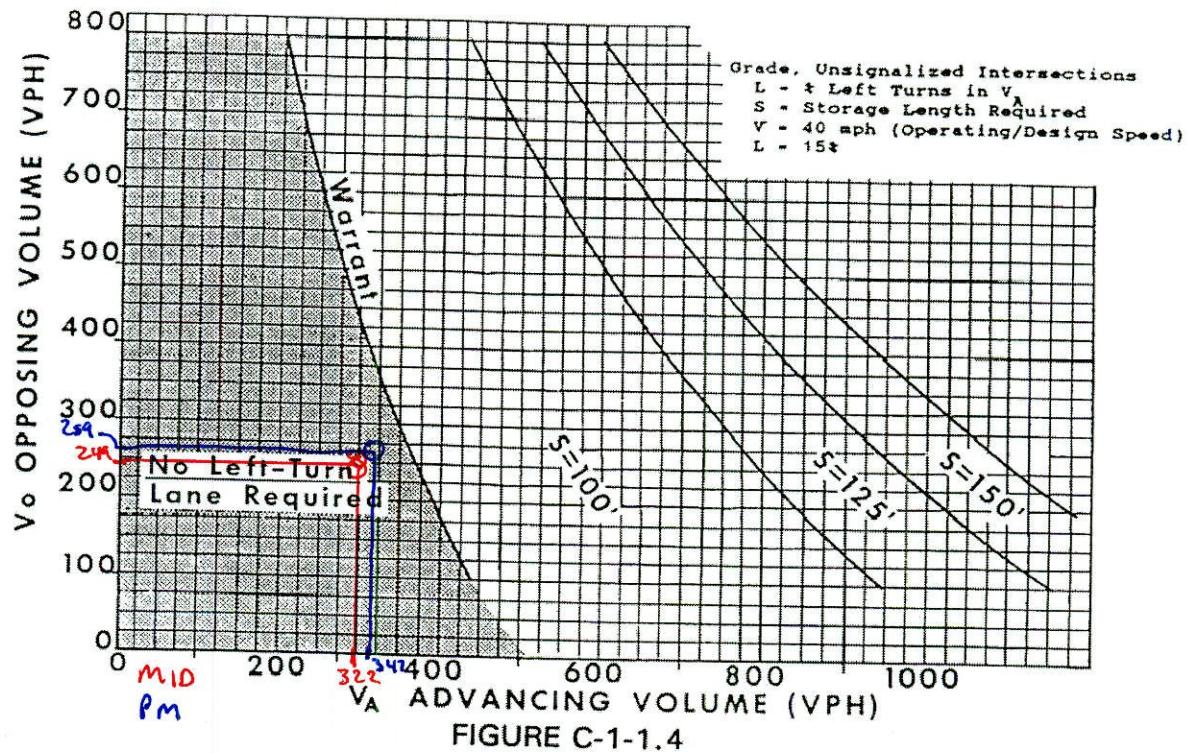
FIGURE C-1-8 GUIDELINES FOR RIGHT TURN TREATMENT (2-LANE HIGHWAY)

SITE ENTRANCE & COUNTRY CLUB DR.

2008 BULLO

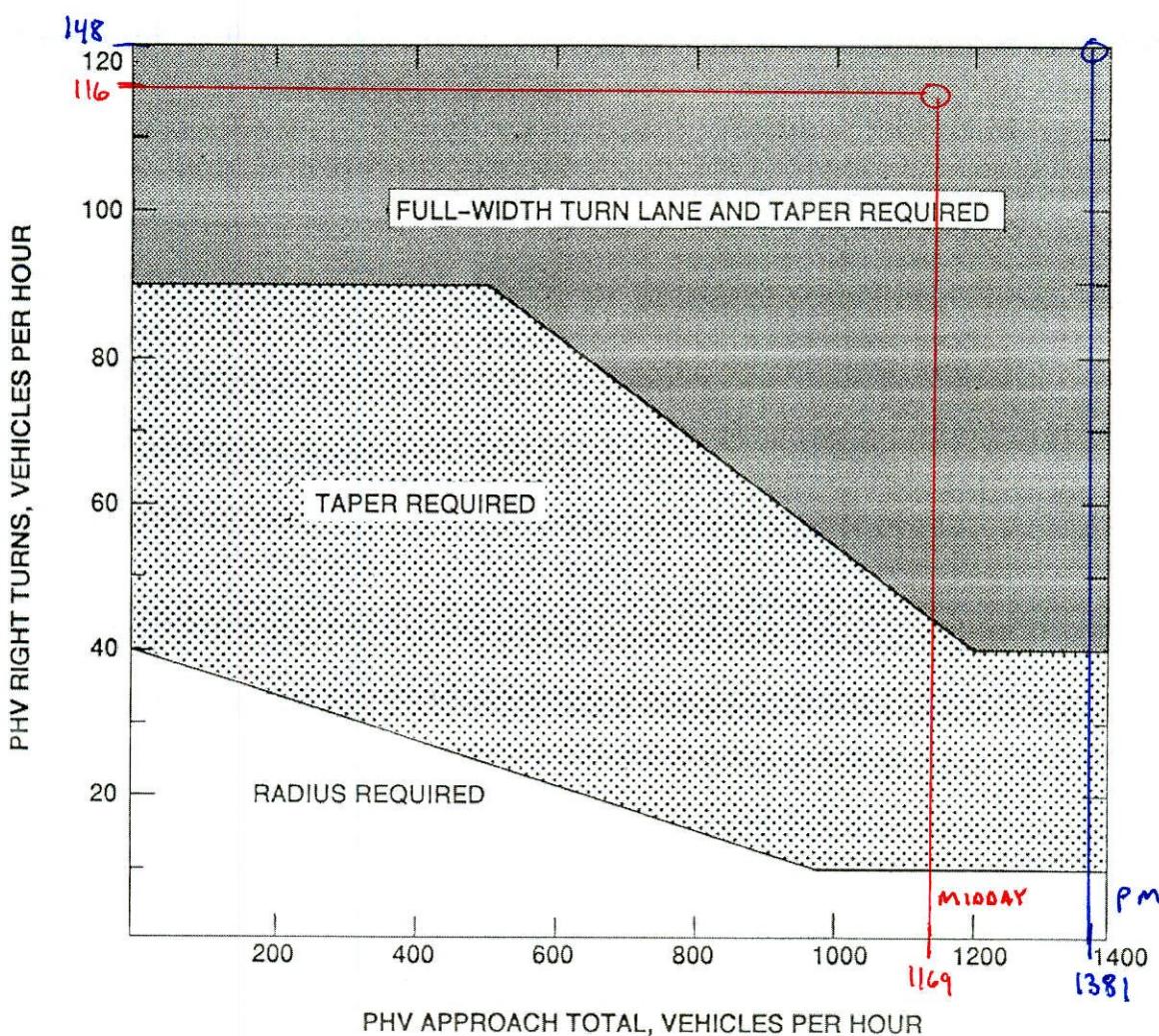
C-9

WARRANT FOR LEFT-TURN STORAGE LANES ON TWO-LANE HIGHWAYS



SITE ENTRANCE @ SOUTH MAIN ST.

2008 BUILD

LEGEND

PHV - Peak Hour Volume (also Design Hourly Volume equivalent)

Adjustment for Right Turns

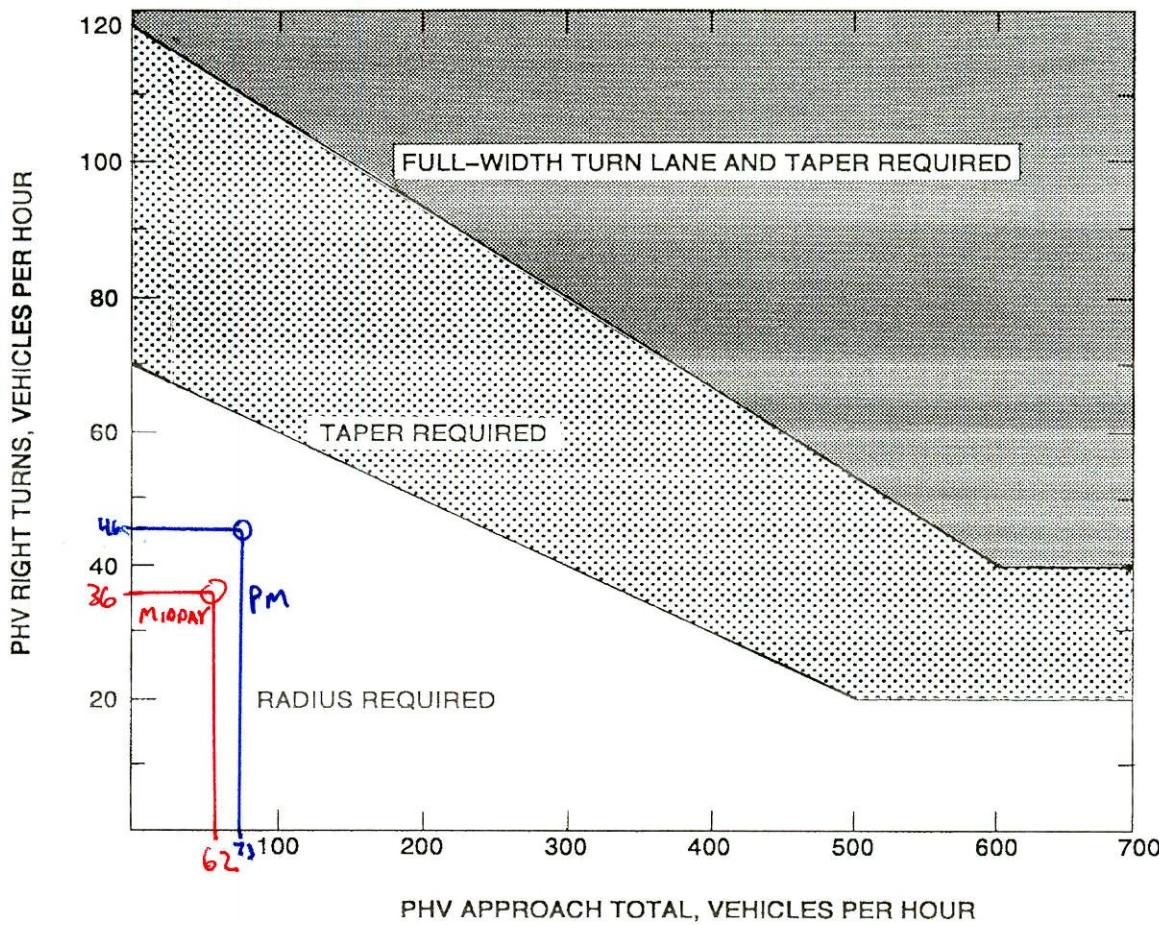
If PHV is not known use formula: $\text{PHV} = \text{ADT} \times K \times D$

K = the percent of AADT occurring in the peak hour

D = the percent of traffic in the peak direction of flow

Note: An average of 11% for K x D will suffice.

FIGURE C-1-9 GUIDELINES FOR RIGHT TURN TREATMENT (4-LANE HIGHWAY)

LEGEND

PHV - Peak Hour Volume (also Design Hourly Volume equivalent)

Adjustment for Right Turns

For posted speeds at or under 70 km/h (45 mph), PHV right turns > 40, and PHV total < 300.

Adjusted right turns - PHV Right Turns - 20

If PHV is not known use formula: $\text{PHV} = \text{ADT} \times K \times D$

K = the percent of AADT occurring in the peak hour

D = the percent of traffic in the peak direction of flow

Note: An average of 11% for K x D will suffice.

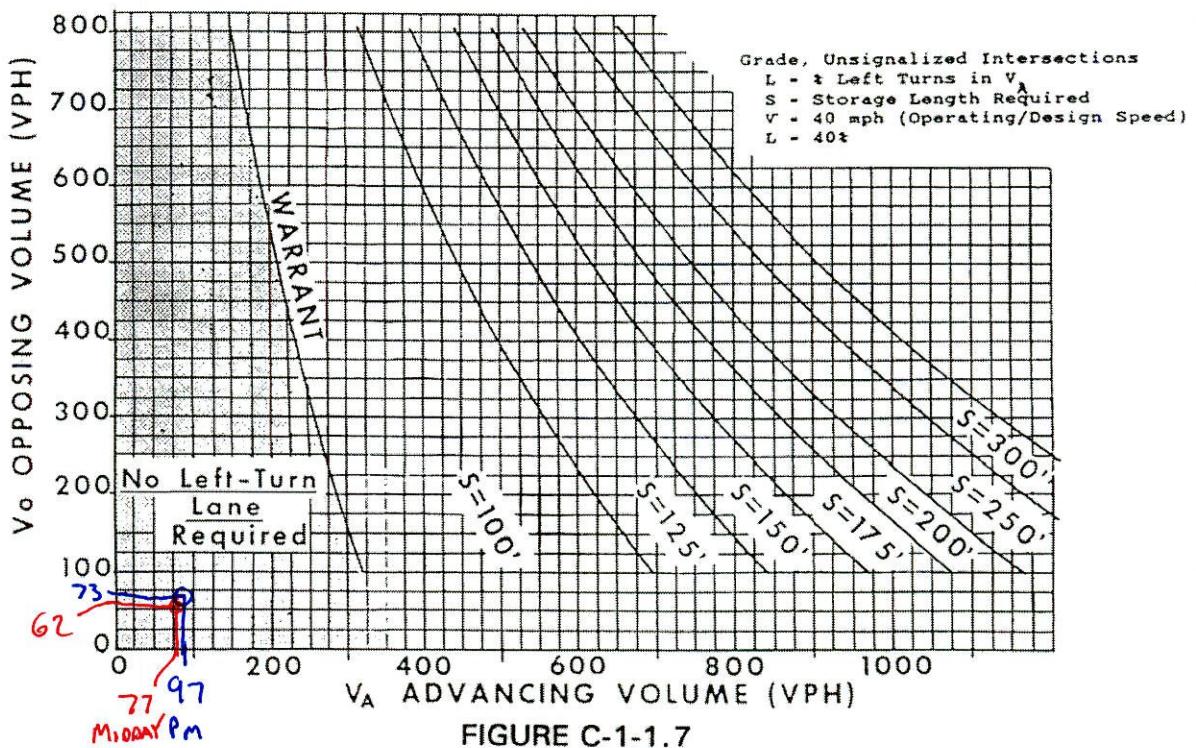
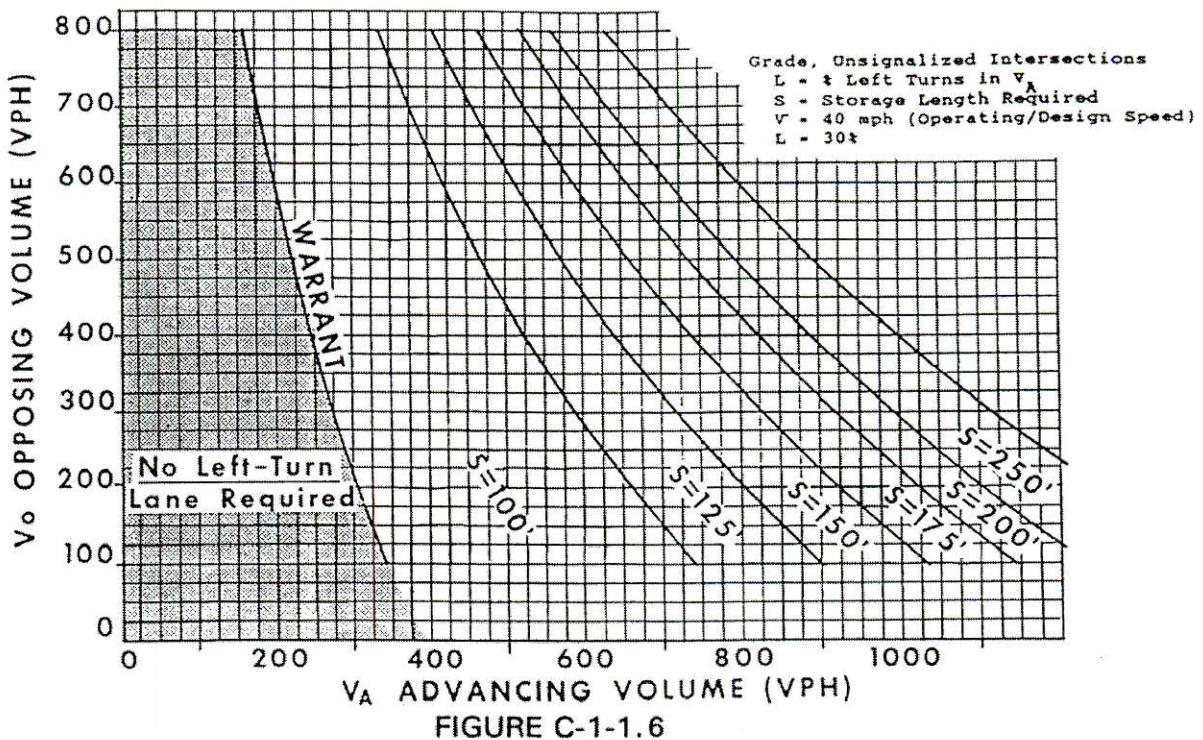
FIGURE C-1-8 GUIDELINES FOR RIGHT TURN TREATMENT (2-LANE HIGHWAY)

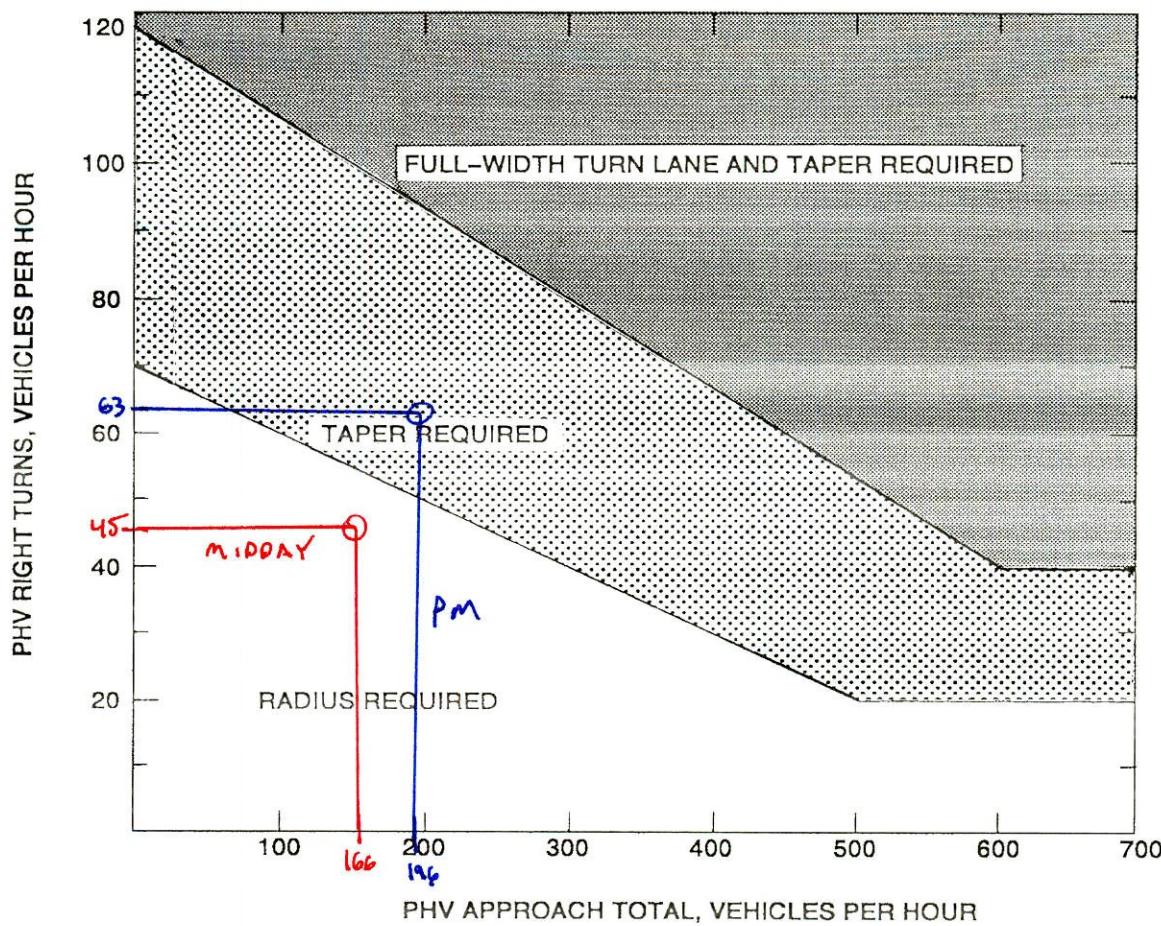
SITE ENTRANCE & KING ST.

C-10

2008 BUILD

WARRANT FOR LEFT-TURN STORAGE LANES ON TWO-LANE HIGHWAYS



LEGEND

PHV - Peak Hour Volume (also Design Hourly Volume equivalent)

Adjustment for Right Turns

For posted speeds at or under 70 km/h (45 mph), PHV right turns > 40, and PHV total < 300.

Adjusted right turns - PHV Right Turns - 20

If PHV is not known use formula: $\text{PHV} = \text{ADT} \times K \times D$

MIDDAY ADJUST.

$$\text{TURN} = 65 - 20 = 45$$

PM ADJUST.

$$\text{TURN} = 83 - 20 = 63$$

K = the percent of AADT occurring in the peak hour
D = the percent of traffic in the peak direction of flow

Note: An average of 11% for K x D will suffice.

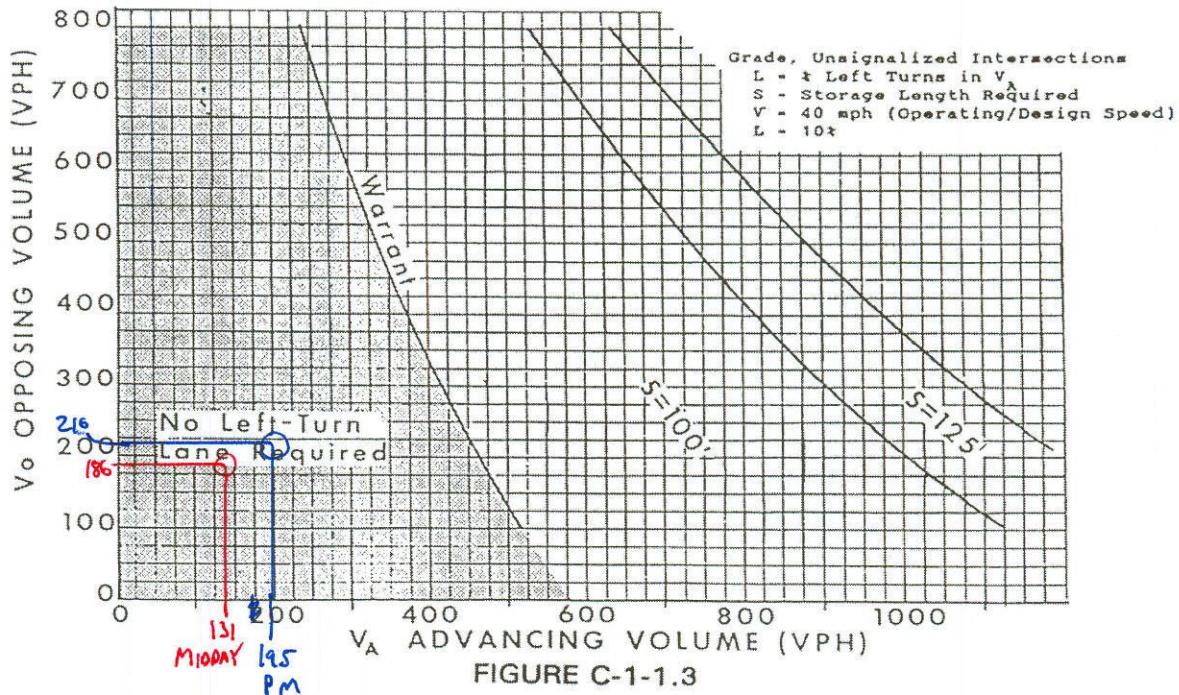
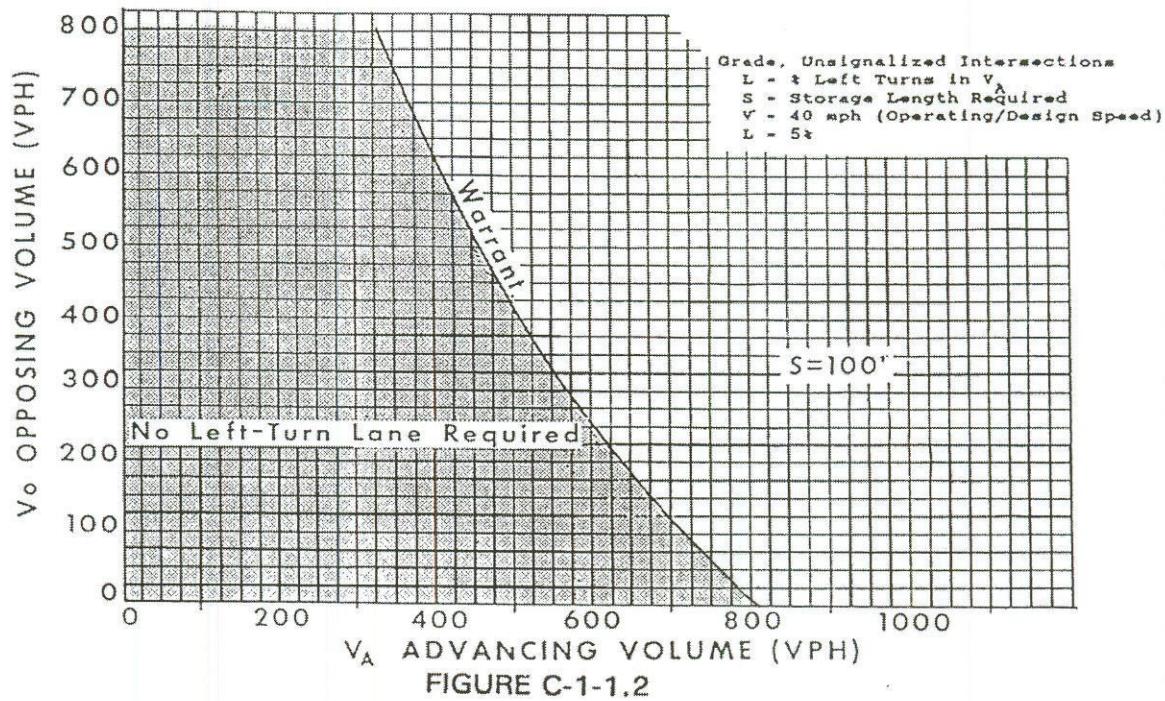
FIGURE C-1-8 GUIDELINES FOR RIGHT TURN TREATMENT (2-LANE HIGHWAY)

KING ST. & HUBBARD ST.

C-8

2008 BUILD

WARRANT FOR LEFT-TURN STORAGE LANES ON TWO-LANE HIGHWAYS



Appendix E

Traffic Signal Warrants

Buildout Year 2008 (with site traffic)

Ardmore Street/Site Entrance & South Main Street
Marlington Street/Site Entrance & South Main Street

Tube Counts for South Main Street in vicinity of proposed entrances

MUTCD Signal Warrants Information

2004 VDOT Data for South Main Street	20000	2008 Projected Traffic Data	Total Growth 7.19%	Site Traffic Assumptions
AAWDT	0.087	21437	0.087	Midday & PM Peak Hours from ITE Trip Generation
K Factor	0.087	0.087	1865	Remaining hours estimated based on total daily site traffic, assume 75% of site traffic between 7 AM and 7 PM
PHV	1740	1740	at 1.75% annual growth	

South Main Street Traffic From Tube Counts, w/ Growth		Traffic From Site Estimated Hourly	8-hour - A Warrant	8-hour - B Warrant	8-hour - A Warrant	8-hour - B Warrant	4-hour Warrant	Peak-Hour Warrant
7-8 AM	1276	184	Mainline	Both	Both	Both	Both	Neither
8-9 AM	1388	184	Mainline	Both	Both	Both	Both	Neither
9-10 AM	1233	184	Mainline	Both	Both	Both	Both	Neither
10-11 AM	1224	184	Mainline	Both	Both	Both	Both	Neither
11-12 PM	1614	184	Mainline	Both	Both	Both	Both	Both
12-1 PM	1844	233	Both	Both	Both	Both	Both	Both
1-2 PM	1746	184	Mainline	Both	Both	Both	Both	Both
2-3 PM	1717	184	Mainline	Both	Both	Both	Both	Both
3-4 PM	1821	184	Mainline	Both	Both	Both	Both	Both
4-5 PM	2039	184	Mainline	Both	Both	Both	Both	Both
5-6 PM	2082	278	Both	Both	Both	Both	Both	Both
6-7 PM	1512	184	Mainline	Both	Both	Both	Both	Neither
		2 Hours	12 Hours	12 Hours	12 Hours	12 Hours	12 Hours	7 Hours
		Meets Warrants? No	Yes	Yes	Yes	Yes	Yes	Yes

Note: Main Street Volumes do not include additional trips to/from the proposed development

Signal Warrants Notes: Area over 10,000 in population, speed limit under 45 MPH
More than 2 lanes on mainline, more than 2 lanes on side street

Based on Traffic Signal Warrants in the Manual on Uniform Traffic Control Devices (MUTCD), 2003 Edition, a traffic signal is warranted at the Intersection of Ardmore Street and South Main Street, where the proposed main entrance to the proposed development is to be located based on projected traffic volumes accessing the site and along South Main Street



Anderson & Associates,
Inc. Blacksburg, VA
Date:
JN:
Scale:

23-Apr-07
22559.41
NTS

First & Main, Blacksburg - Traffic Impact Study
Blacksburg, Virginia

**Ardmore Signal
Warrants Data**

2004 VDOT Data for South Main Street	Projected Traffic Data	Total Growth	Site Traffic Assumptions
AAWDT 20000	21437	7.19%	Midday & PM Peak Hours from ITE Trip Generation
K Factor 0.087	0.087		Remaining hours estimated based on total daily site traffic, assume
PHV 1740	1865		75% of site traffic between 7 AM and 7 PM

at 1.75% annual growth

South Main Street Traffic From Tube Counts, w/ Growth	Traffic From Site Estimated Hourly	8-hour - A Warrant	8-hour - B Warrant	8-hour - A Warrant	8-hour - B Warrant	4-hour Warrant	Peak-Hour Warrant
7-8 AM 1276	184	Mainline	Both	Both	Both	Both	Neither
8-9 AM 1388	184	Mainline	Both	Both	Both	Both	Neither
9-10 AM 1233	184	Mainline	Both	Both	Both	Both	Neither
10-11 AM 1224	184	Mainline	Both	Both	Both	Both	Neither
11-12 PM 1614	184	Mainline	Both	Both	Both	Both	Both
12-1 PM 1844	233	Both	Both	Both	Both	Both	Both
1-2 PM 1746	184	Mainline	Both	Both	Both	Both	Both
2-3 PM 1717	184	Mainline	Both	Both	Both	Both	Both
3-4 PM 1821	184	Mainline	Both	Both	Both	Both	Both
4-5 PM 2039	184	Mainline	Both	Both	Both	Both	Both
5-6 PM 2082	278	Both	Both	Both	Both	Both	Both
6-7 PM 1512	184	Mainline	Both	Both	Both	Both	Neither
		2 Hours	12 Hours	12 Hours	12 Hours	12 Hours	7 Hours
		Meets Warrants? No	Yes	Yes	Yes	Yes	Yes

Note: Main Street Volumes do not include additional trips to/from the proposed development

Signal Warrants Notes: Area over 10,000 in population, speed limit under 45 MPH

More than 2 lanes on mainline, more than 2 lanes on side street

Based on Traffic Signal Warrants in the Manual on Uniform Traffic Control Devices (MUTCD), 2003 Edition, a traffic signal is warranted at the Intersection of Marlinton Street and South Main Street, where the proposed entrance to the proposed development is to be located based on projected traffic volumes accessing the site and along South Main Street



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Inc. Blacksburg, VA

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23-Apr-07
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First & Main, Blacksburg - Traffic Impact Study
Blacksburg, Virginia

**Marlinton Signal
Warrants Data**

File Name: Main Street - North of Ardmore St.

Start Date: 11/15/2004

Start Time: 1:00:00 PM

Number	Date	Time	Totals	Hour Totals	Trucks	Buses
1	11/15/2004	6:15:00 PM	174		5	2
2	11/15/2004	6:30:00 PM	148		2	0
3	11/15/2004	6:45:00 PM	151		2	0
4	11/15/2004	7:00:00 PM	135	608	0	0
5	11/15/2004	7:15:00 PM	133	567	1	1
6	11/15/2004	7:30:00 PM	91	510	0	0
7	11/15/2004	7:45:00 PM	95	454	1	0
8	11/15/2004	8:00:00 PM	99	418	0	1
9	11/15/2004	8:15:00 PM	96	381	0	1
10	11/15/2004	8:30:00 PM	69	359	1	0
11	11/15/2004	8:45:00 PM	82	346	3	0
12	11/15/2004	9:00:00 PM	89	336	2	0
13	11/15/2004	9:15:00 PM	76	316	0	1
14	11/15/2004	9:30:00 PM	79	326	0	0
15	11/15/2004	9:45:00 PM	78	322	0	2
16	11/15/2004	10:00:00 PM	52	285	0	0
17	11/15/2004	10:15:00 PM	59	268	0	2
18	11/15/2004	10:30:00 PM	40	229	0	0
19	11/15/2004	10:45:00 PM	45	196	0	0
20	11/15/2004	11:00:00 PM	46	190	0	1
21	11/15/2004	11:15:00 PM	32	163	0	1
22	11/15/2004	11:30:00 PM	33	156	0	0
23	11/15/2004	11:45:00 PM	34	145	0	0
24	11/16/2004	12:00:00 AM	31	130	0	0
25	11/16/2004	12:15:00 AM	31	129	0	1
26	11/16/2004	12:30:00 AM	18	114	1	1
27	11/16/2004	12:45:00 AM	22	102	1	0
28	11/16/2004	1:00:00 AM	15	86	0	0
29	11/16/2004	1:15:00 AM	15	70	0	0
30	11/16/2004	1:30:00 AM	10	62	1	0
31	11/16/2004	1:45:00 AM	9	49	0	0
32	11/16/2004	2:00:00 AM	18	52	0	0
33	11/16/2004	2:15:00 AM	13	50	0	0
34	11/16/2004	2:30:00 AM	10	50	0	0
35	11/16/2004	2:45:00 AM	12	53	0	0
36	11/16/2004	3:00:00 AM	7	42	0	0
37	11/16/2004	3:15:00 AM	8	37	0	0
38	11/16/2004	3:30:00 AM	5	32	0	0
39	11/16/2004	3:45:00 AM	4	24	0	0
40	11/16/2004	4:00:00 AM	6	23	0	0
41	11/16/2004	4:15:00 AM	4	19	0	1
42	11/16/2004	4:30:00 AM	7	21	0	0
43	11/16/2004	4:45:00 AM	10	27	0	0
44	11/16/2004	5:00:00 AM	4	25	0	0
45	11/16/2004	5:15:00 AM	12	33	0	0
46	11/16/2004	5:30:00 AM	11	37	0	0

47	11/16/2004	5:45:00 AM	18	45	0	0
48	11/16/2004	6:00:00 AM	16	57	0	0
49	11/16/2004	6:15:00 AM	38	83	2	1
50	11/16/2004	6:30:00 AM	40	112	0	0
51	11/16/2004	6:45:00 AM	60	154	4	1
52	11/16/2004	7:00:00 AM	73	211	3	0
53	11/16/2004	7:15:00 AM	76	249	1	1
54	11/16/2004	7:30:00 AM	116	325	4	0
55	11/16/2004	7:45:00 AM	123	388	2	1
56	11/16/2004	8:00:00 AM	133	448	4	0
57	11/16/2004	8:15:00 AM	130	502	4	1
58	11/16/2004	8:30:00 AM	136	522	7	0
59	11/16/2004	8:45:00 AM	147	546	4	2
60	11/16/2004	9:00:00 AM	151	564	3	0
61	11/16/2004	9:15:00 AM	137	571	4	1
62	11/16/2004	9:30:00 AM	158	593	9	0
63	11/16/2004	9:45:00 AM	129	575	5	1
64	11/16/2004	10:00:00 AM	130	554	1	3
65	11/16/2004	10:15:00 AM	108	525	1	1
66	11/16/2004	10:30:00 AM	138	505	6	1
67	11/16/2004	10:45:00 AM	171	547	4	2
68	11/16/2004	11:00:00 AM	166	583	4	1
69	11/16/2004	11:15:00 AM	164	639	4	2
70	11/16/2004	11:30:00 AM	168	669	4	0
71	11/16/2004	11:45:00 AM	170	668	5	1
72	11/16/2004	12:00:00 PM	218	720	9	0
73	11/16/2004	12:15:00 PM	201	757	1	2
74	11/16/2004	12:30:00 PM	237	826	6	1
75	11/16/2004	12:45:00 PM	222	878	4	1
76	11/16/2004	1:00:00 PM	211	871	8	1
77	11/16/2004	1:15:00 PM	189	859	2	2
78	11/16/2004	1:30:00 PM	206	828	4	0
79	11/16/2004	1:45:00 PM	188	794	4	1
80	11/16/2004	2:00:00 PM	197	780	4	1
81	11/16/2004	2:15:00 PM	177	768	2	1
82	11/16/2004	2:30:00 PM	179	741	7	0
83	11/16/2004	2:45:00 PM	198	751	4	1
84	11/16/2004	3:00:00 PM	183	737	6	2
85	11/16/2004	3:15:00 PM	217	777	2	1
86	11/16/2004	3:30:00 PM	236	834	5	1
87	11/16/2004	3:45:00 PM	234	870	3	2
88	11/16/2004	4:00:00 PM	197	884	2	0
89	11/16/2004	4:15:00 PM	210	877	3	2
90	11/16/2004	4:30:00 PM	224	865	8	0
91	11/16/2004	4:45:00 PM	212	843	1	2
92	11/16/2004	5:00:00 PM	276	922	3	0
93	11/16/2004	5:15:00 PM	261	973	3	1
94	11/16/2004	5:30:00 PM	225	974	3	1
95	11/16/2004	5:45:00 PM	192	954	1	2
96	11/16/2004	6:00:00 PM	207	885	7	1
97	11/16/2004	6:15:00 PM	184	808	0	1

98	11/16/2004	6:30:00 PM	153	736	2	0
99	11/16/2004	6:45:00 PM	153	697	2	1
100	11/16/2004	7:00:00 PM	167	657	1	0
101	11/16/2004	7:15:00 PM	119	592	0	1
102	11/16/2004	7:30:00 PM	107	546	0	0
103	11/16/2004	7:45:00 PM	103	496	1	2
104	11/16/2004	8:00:00 PM	106	435	0	0
105	11/16/2004	8:15:00 PM	97	413	0	1
106	11/16/2004	8:30:00 PM	89	395	0	0
107	11/16/2004	8:45:00 PM	92	384	1	1
108	11/16/2004	9:00:00 PM	115	393	2	1
109	11/16/2004	9:15:00 PM	72	368	0	1
110	11/16/2004	9:30:00 PM	81	360	0	0
111	11/16/2004	9:45:00 PM	69	337	1	2
112	11/16/2004	10:00:00 PM	71	293	0	2
113	11/16/2004	10:15:00 PM	74	295	0	1
114	11/16/2004	10:30:00 PM	59	273	1	0
115	11/16/2004	10:45:00 PM	56	260	0	0
116	11/16/2004	11:00:00 PM	55	244	0	0
117	11/16/2004	11:15:00 PM	48	218	0	1
118	11/16/2004	11:30:00 PM	40	199	0	0
119	11/16/2004	11:45:00 PM	44	187	0	0
120	11/17/2004	12:00:00 AM	36	168	0	0
121	11/17/2004	12:15:00 AM	37	157	1	2
122	11/17/2004	12:30:00 AM	29	146	2	0
123	11/17/2004	12:45:00 AM	15	117	1	1
124	11/17/2004	1:00:00 AM	21	102	0	0
125	11/17/2004	1:15:00 AM	22	87	0	0
126	11/17/2004	1:30:00 AM	17	75	0	0
127	11/17/2004	1:45:00 AM	15	75	0	0
128	11/17/2004	2:00:00 AM	13	67	0	0
129	11/17/2004	2:15:00 AM	16	61	1	0
130	11/17/2004	2:30:00 AM	9	53	0	0
131	11/17/2004	2:45:00 AM	10	48	0	0
132	11/17/2004	3:00:00 AM	8	43	0	0
133	11/17/2004	3:15:00 AM	3	30	0	0
134	11/17/2004	3:30:00 AM	10	31	0	1
135	11/17/2004	3:45:00 AM	12	33	2	0
136	11/17/2004	4:00:00 AM	5	30	0	0
137	11/17/2004	4:15:00 AM	4	31	0	0
138	11/17/2004	4:30:00 AM	4	25	0	0
139	11/17/2004	4:45:00 AM	8	21	2	0
140	11/17/2004	5:00:00 AM	10	26	0	0
141	11/17/2004	5:15:00 AM	5	27	0	0
142	11/17/2004	5:30:00 AM	14	37	0	0
143	11/17/2004	5:45:00 AM	16	45	0	0
144	11/17/2004	6:00:00 AM	20	55	0	0
145	11/17/2004	6:15:00 AM	29	79	0	0
146	11/17/2004	6:30:00 AM	45	110	0	0
147	11/17/2004	6:45:00 AM	65	159	2	2
148	11/17/2004	7:00:00 AM	77	216	3	1

149	11/17/2004	7:15:00 AM	86	273	2	0
150	11/17/2004	7:30:00 AM	118	346	1	0
151	11/17/2004	7:45:00 AM	128	409	3	0
152	11/17/2004	8:00:00 AM	140	472	3	0
153	11/17/2004	8:15:00 AM	148	534	1	0
154	11/17/2004	8:30:00 AM	140	556	10	0
155	11/17/2004	8:45:00 AM	156	584	6	0
156	11/17/2004	9:00:00 AM	147	591	3	0
157	11/17/2004	9:15:00 AM	140	583	5	1
158	11/17/2004	9:30:00 AM	144	587	4	0
159	11/17/2004	9:45:00 AM	130	561	1	0
160	11/17/2004	10:00:00 AM	138	552	3	1
161	11/17/2004	10:15:00 AM	146	558	2	3
162	11/17/2004	10:30:00 AM	140	554	4	0
163	11/17/2004	10:45:00 AM	152	576	4	1
164	11/17/2004	11:00:00 AM	133	571	5	0
165	11/17/2004	11:15:00 AM	151	576	3	3
166	11/17/2004	11:30:00 AM	190	626	3	3
167	11/17/2004	11:45:00 AM	201	675	4	1
168	11/17/2004	12:00:00 PM	193	735	4	0
169	11/17/2004	12:15:00 PM	242	826	3	1
170	11/17/2004	12:30:00 PM	207	843	3	0
171	11/17/2004	12:45:00 PM	216	858	9	1
172	11/17/2004	1:00:00 PM	217	882	6	1
173	11/17/2004	1:15:00 PM	237	877	3	1
174	11/17/2004	1:30:00 PM	223	893	5	0
175	11/17/2004	1:45:00 PM	189	866	2	2
176	11/17/2004	2:00:00 PM	200	849	3	1
177	11/17/2004	2:15:00 PM	197	809	2	1
178	11/17/2004	2:30:00 PM	206	792	6	0
179	11/17/2004	2:45:00 PM	223	826	4	1
180	11/17/2004	3:00:00 PM	196	822	8	0
181	11/17/2004	3:15:00 PM	192	817	1	1
182	11/17/2004	3:30:00 PM	225	836	6	0
183	11/17/2004	3:45:00 PM	224	837	7	1
184	11/17/2004	4:00:00 PM	233	874	4	2
185	11/17/2004	4:15:00 PM	221	903	6	1
186	11/17/2004	4:30:00 PM	206	884	3	2
187	11/17/2004	4:45:00 PM	223	883	3	1
188	11/17/2004	5:00:00 PM	309	959	2	0
189	11/17/2004	5:15:00 PM	260	998	1	1
190	11/17/2004	5:30:00 PM	267	1059	2	0
191	11/17/2004	5:45:00 PM	219	1055	4	0
192	11/17/2004	6:00:00 PM	216	962	8	4
193	11/17/2004	6:15:00 PM	195	897	1	4
194	11/17/2004	6:30:00 PM	139	769	3	0
195	11/17/2004	6:45:00 PM	150	700	3	0
196	11/17/2004	7:00:00 PM	188	672	0	1
197	11/17/2004	7:15:00 PM	140	617	1	1
198	11/17/2004	7:30:00 PM	117	595	2	0
199	11/17/2004	7:45:00 PM	115	560	1	0

200	11/17/2004	8:00:00 PM	127	499	2	0
201	11/17/2004	8:15:00 PM	106	465	0	1
202	11/17/2004	8:30:00 PM	104	452	0	0
203	11/17/2004	8:45:00 PM	143	480	2	0
204	11/17/2004	9:00:00 PM	96	449	1	0
205	11/17/2004	9:15:00 PM	101	444	1	1
206	11/17/2004	9:30:00 PM	91	431	0	0
207	11/17/2004	9:45:00 PM	84	372	1	2
208	11/17/2004	10:00:00 PM	75	351	0	1
209	11/17/2004	10:15:00 PM	65	315	1	3
210	11/17/2004	10:30:00 PM	65	289	1	0
211	11/17/2004	10:45:00 PM	65	270	0	0
212	11/17/2004	11:00:00 PM	38	233	0	0
213	11/17/2004	11:15:00 PM	46	214	0	1
214	11/17/2004	11:30:00 PM	45	194	0	0
215	11/17/2004	11:45:00 PM	40	169	0	0
216	11/18/2004	12:00:00 AM	44	175	0	0
217	11/18/2004	12:15:00 AM	43	172	0	1
218	11/18/2004	12:30:00 AM	31	158	2	0
219	11/18/2004	12:45:00 AM	30	148	0	1
220	11/18/2004	1:00:00 AM	19	123	0	1
221	11/18/2004	1:15:00 AM	20	100	0	0
222	11/18/2004	1:30:00 AM	26	95	0	0
223	11/18/2004	1:45:00 AM	25	90	0	0
224	11/18/2004	2:00:00 AM	32	103	1	0
225	11/18/2004	2:15:00 AM	21	104	0	0
226	11/18/2004	2:30:00 AM	26	104	0	0
227	11/18/2004	2:45:00 AM	10	89	0	0
228	11/18/2004	3:00:00 AM	12	69	0	0
229	11/18/2004	3:15:00 AM	10	58	0	0
230	11/18/2004	3:30:00 AM	9	41	0	1
231	11/18/2004	3:45:00 AM	10	41	0	0
232	11/18/2004	4:00:00 AM	6	35	0	0
233	11/18/2004	4:15:00 AM	9	34	0	0
234	11/18/2004	4:30:00 AM	7	32	0	0
235	11/18/2004	4:45:00 AM	9	31	0	0
236	11/18/2004	5:00:00 AM	7	32	0	0
237	11/18/2004	5:15:00 AM	11	34	0	0
238	11/18/2004	5:30:00 AM	12	39	0	0
239	11/18/2004	5:45:00 AM	20	50	0	0
240	11/18/2004	6:00:00 AM	26	69	1	1
241	11/18/2004	6:15:00 AM	30	88	0	1
242	11/18/2004	6:30:00 AM	47	123	2	0
243	11/18/2004	6:45:00 AM	74	177	3	1
244	11/18/2004	7:00:00 AM	83	234	2	1
245	11/18/2004	7:15:00 AM	96	300	4	2
246	11/18/2004	7:30:00 AM	121	374	3	0
247	11/18/2004	7:45:00 AM	138	438	3	2
248	11/18/2004	8:00:00 AM	127	482	3	0
249	11/18/2004	8:15:00 AM	156	542	4	1
250	11/18/2004	8:30:00 AM	130	551	2	1

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251	11/18/2004	8:45:00 AM	165	578	3	2		
252	11/18/2004	9:00:00 AM	168	619	3	1		
253	11/18/2004	9:15:00 AM	136	599	1	3		
254	11/18/2004	9:30:00 AM	164	633	4	0 PHF=	0.94	
255	11/18/2004	9:45:00 AM	161	629	3	2		
256	11/18/2004	10:00:00 AM	131	592	4	0		
257	11/18/2004	10:15:00 AM	163	619	2	2		
258	11/18/2004	10:30:00 AM	170	625	5	0		
259	11/18/2004	10:45:00 AM	81	545	1	1		
260	11/18/2004	11:00:00 AM	0	414	0	0		
261	11/18/2004	11:15:00 AM	0	251	0	0		
262	11/18/2004	11:30:00 AM	4	85	0	0		
263	11/18/2004	11:45:00 AM	0	4	0	0		
264	11/18/2004	12:00:00 PM	0	4	0	0		
265	11/18/2004	12:15:00 PM	0	4	0	0		
266	11/18/2004	12:30:00 PM	0	0	0	0		
267	11/18/2004	12:45:00 PM	0	0	0	0		
268	11/18/2004	1:00:00 PM	0	0	0	0		
269	11/18/2004	1:15:00 PM	0	0	0	0		
270	11/18/2004	1:30:00 PM	0	0	0	0		
271	11/18/2004	1:45:00 PM	0	0	0	0		
272	11/18/2004	2:00:00 PM	0	0	0	0		
273	11/18/2004	2:15:00 PM	0	0	0	0		
274	11/18/2004	2:30:00 PM	0	0	0	0		
275	11/18/2004	2:45:00 PM	0	0	0	0		
276	11/18/2004	3:00:00 PM	0	0	0	0		
277	11/18/2004	3:15:00 PM	0	0	0	0		
278	11/18/2004	3:30:00 PM	0	0	0	0		
279	11/18/2004	3:45:00 PM	0	0	0	0		
280	11/18/2004	4:00:00 PM	0	0	0	0		
281	11/18/2004	4:15:00 PM	0	0	0	0		
282	11/18/2004	4:30:00 PM	0	0	0	0		
283	11/18/2004	4:45:00 PM	0	0	0	0		
284	11/18/2004	5:00:00 PM	0	0	0	0		
285	11/18/2004	5:15:00 PM	0	0	0	0		
286	11/18/2004	5:30:00 PM	0	0	0	0		
287	11/18/2004	5:45:00 PM	0	0	0	0		
288	11/18/2004	6:00:00 PM	0	0	0	0		
289	11/18/2004	6:15:00 PM	0	0	0	0		
290	11/18/2004	6:30:00 PM	0	0	0	0		
291	11/18/2004	6:45:00 PM	0	0	0	0		
292	11/18/2004	7:00:00 PM	0	0	0	0		
293	11/18/2004	7:15:00 PM	0	0	0	0		
294	11/18/2004	7:30:00 PM	0	0	0	0		
295	11/18/2004	7:45:00 PM	0	0	0	0		
296	11/18/2004	8:00:00 PM	0	0	0	0		
297	11/18/2004	8:15:00 PM	0	0	0	0		
298	11/18/2004	8:30:00 PM	0	0	0	0		
299	11/18/2004	8:45:00 PM	0	0	0	0		
300	11/18/2004	9:00:00 PM	0	0	0	0		
301	11/18/2004	9:15:00 PM	0	0	0	0		

302	11/18/2004	9:30:00 PM	0	0	0	0
303	11/18/2004	9:45:00 PM	0	0	0	0
304	11/18/2004	10:00:00 PM	0	0	0	0
305	11/18/2004	10:15:00 PM	0	0	0	0
306	11/18/2004	10:30:00 PM	0	0	0	0
307	11/18/2004	10:45:00 PM	0	0	0	0
308	11/18/2004	11:00:00 PM	0	0	0	0
309	11/18/2004	11:15:00 PM	0	0	0	0
310	11/18/2004	11:30:00 PM	0	0	0	0
311	11/18/2004	11:45:00 PM	0	0	0	0
312	11/19/2004	12:00:00 AM	0	0	0	0
313	11/19/2004	12:15:00 AM	0	0	0	0
314	11/19/2004	12:30:00 AM	0	0	0	0
315	11/19/2004	12:45:00 AM	0	0	0	0
316	11/19/2004	1:00:00 AM	0	0	0	0
317	11/19/2004	1:15:00 AM	0	0	0	0
318	11/19/2004	1:30:00 AM	0	0	0	0
319	11/19/2004	1:45:00 AM	0	0	0	0
320	11/19/2004	2:00:00 AM	0	0	0	0
321	11/19/2004	2:15:00 AM	0	0	0	0
322	11/19/2004	2:30:00 AM	0	0	0	0
323	11/19/2004	2:45:00 AM	0	0	0	0
324	11/19/2004	3:00:00 AM	0	0	0	0
325	11/19/2004	3:15:00 AM	0	0	0	0
326	11/19/2004	3:30:00 AM	0	0	0	0
327	11/19/2004	3:45:00 AM	0	0	0	0
328	11/19/2004	4:00:00 AM	0	0	0	0
329	11/19/2004	4:15:00 AM	0	0	0	0
330	11/19/2004	4:30:00 AM	0	0	0	0
331	11/19/2004	4:45:00 AM	0	0	0	0
332	11/19/2004	5:00:00 AM	0	0	0	0
333	11/19/2004	5:15:00 AM	0	0	0	0
334	11/19/2004	5:30:00 AM	0	0	0	0
335	11/19/2004	5:45:00 AM	0	0	0	0
336	11/19/2004	6:00:00 AM	0	0	0	0
337	11/19/2004	6:15:00 AM	0	0	0	0
338	11/19/2004	6:30:00 AM	0	0	0	0
339	11/19/2004	6:45:00 AM	0	0	0	0
340	11/19/2004	7:00:00 AM	0	0	0	0
341	11/19/2004	7:15:00 AM	0	0	0	0
342	11/19/2004	7:30:00 AM	0	0	0	0
343	11/19/2004	7:45:00 AM	0	0	0	0
344	11/19/2004	8:00:00 AM	0	0	0	0
345	11/19/2004	8:15:00 AM	0	0	0	0
346	11/19/2004	8:30:00 AM	0	0	0	0
347	11/19/2004	8:45:00 AM	0	0	0	0
348	11/19/2004	9:00:00 AM	0	0	0	0
349	11/19/2004	9:15:00 AM	0	0	0	0
350	11/19/2004	9:30:00 AM	0	0	0	0
351	11/19/2004	9:45:00 AM	0	0	0	0
352	11/19/2004	10:00:00 AM	0	0	0	0

353	11/19/2004	10:15:00 AM	0	0	0	0
354	11/19/2004	10:30:00 AM	0	0	0	0
355	11/19/2004	10:45:00 AM	0	0	0	0
356	11/19/2004	11:00:00 AM	0	0	0	0
357	11/19/2004	11:15:00 AM	0	0	0	0
358	11/19/2004	11:30:00 AM	0	0	0	0
359	11/19/2004	11:45:00 AM	0	0	0	0
360	11/19/2004	12:00:00 PM	0	0	0	0
361	11/19/2004	12:15:00 PM	0	0	0	0
362	11/19/2004	12:30:00 PM	0	0	0	0
363	11/19/2004	12:45:00 PM	0	0	0	0

Main Street - North of Ardmore St.

Start Date: 11/15/2004

Start Time: 1:00:00 PM

Number	Date	Time	Total	Hour Totals	Trucks	Buses
1	11/15/2004	6:15:00 PM	181		1	0
2	11/15/2004	6:30:00 PM	175		0	2
3	11/15/2004	6:45:00 PM	140		1	0
4	11/15/2004	7:00:00 PM	133	629	2	0
5	11/15/2004	7:15:00 PM	139	587	1	0
6	11/15/2004	7:30:00 PM	104	516	1	1
7	11/15/2004	7:45:00 PM	83	459	1	1
8	11/15/2004	8:00:00 PM	104	430	2	0
9	11/15/2004	8:15:00 PM	89	380	1	0
10	11/15/2004	8:30:00 PM	107	383	2	1
11	11/15/2004	8:45:00 PM	82	382	1	0
12	11/15/2004	9:00:00 PM	66	344	1	0
13	11/15/2004	9:15:00 PM	71	326	0	0
14	11/15/2004	9:30:00 PM	81	300	1	1
15	11/15/2004	9:45:00 PM	63	281	1	0
16	11/15/2004	10:00:00 PM	68	283	0	0
17	11/15/2004	10:15:00 PM	45	257	0	0
18	11/15/2004	10:30:00 PM	59	235	0	1
19	11/15/2004	10:45:00 PM	37	209	0	0
20	11/15/2004	11:00:00 PM	36	177	1	1
21	11/15/2004	11:15:00 PM	33	165	0	0
22	11/15/2004	11:30:00 PM	46	152	0	1
23	11/15/2004	11:45:00 PM	26	141	0	0
24	11/16/2004	12:00:00 AM	25	130	0	0
25	11/16/2004	12:15:00 AM	18	115	0	0
26	11/16/2004	12:30:00 AM	15	84	1	0
27	11/16/2004	12:45:00 AM	15	73	0	0
28	11/16/2004	1:00:00 AM	20	68	0	0
29	11/16/2004	1:15:00 AM	12	62	0	0
30	11/16/2004	1:30:00 AM	16	63	0	0
31	11/16/2004	1:45:00 AM	14	62	0	0
32	11/16/2004	2:00:00 AM	7	49	0	0
33	11/16/2004	2:15:00 AM	5	42	0	0
34	11/16/2004	2:30:00 AM	3	29	0	0
35	11/16/2004	2:45:00 AM	9	24	0	0
36	11/16/2004	3:00:00 AM	5	22	0	0
37	11/16/2004	3:15:00 AM	8	25	0	0
38	11/16/2004	3:30:00 AM	6	28	0	0
39	11/16/2004	3:45:00 AM	3	22	0	0
40	11/16/2004	4:00:00 AM	3	20	0	0
41	11/16/2004	4:15:00 AM	9	21	0	0
42	11/16/2004	4:30:00 AM	12	27	0	0
43	11/16/2004	4:45:00 AM	16	40	0	0
44	11/16/2004	5:00:00 AM	10	47	0	0
45	11/16/2004	5:15:00 AM	9	47	0	0
46	11/16/2004	5:30:00 AM	16	51	0	0
47	11/16/2004	5:45:00 AM	23	58	1	0
48	11/16/2004	6:00:00 AM	25	73	3	0
49	11/16/2004	6:15:00 AM	41	105	3	3
50	11/16/2004	6:30:00 AM	66	155	3	1
51	11/16/2004	6:45:00 AM	90	222	6	2
52	11/16/2004	7:00:00 AM	95	292	2	1
53	11/16/2004	7:15:00 AM	134	385	7	0

54	11/16/2004	7:30:00 AM	178	497	15	1
55	11/16/2004	7:45:00 AM	206	613	9	0
56	11/16/2004	8:00:00 AM	163	681	8	1
57	11/16/2004	8:15:00 AM	169	716	8	0
58	11/16/2004	8:30:00 AM	165	703	5	1
59	11/16/2004	8:45:00 AM	196	693	8	1
60	11/16/2004	9:00:00 AM	173	703	4	2
61	11/16/2004	9:15:00 AM	154	688	7	1
62	11/16/2004	9:30:00 AM	140	663	2	1
63	11/16/2004	9:45:00 AM	149	616	3	0
64	11/16/2004	10:00:00 AM	138	581	6	1
65	11/16/2004	10:15:00 AM	121	548	6	0
66	11/16/2004	10:30:00 AM	143	551	7	1
67	11/16/2004	10:45:00 AM	177	579	8	0
68	11/16/2004	11:00:00 AM	139	580	4	2
69	11/16/2004	11:15:00 AM	172	631	4	1
70	11/16/2004	11:30:00 AM	179	667	6	1
71	11/16/2004	11:45:00 AM	223	713	3	1
72	11/16/2004	12:00:00 PM	223	797	6	1
73	11/16/2004	12:15:00 PM	257	882	13	1
74	11/16/2004	12:30:00 PM	225	928	4	1 PHF= 0.90
75	11/16/2004	12:45:00 PM	196	901	7	0
76	11/16/2004	1:00:00 PM	187	865	4	1
77	11/16/2004	1:15:00 PM	177	785	8	0
78	11/16/2004	1:30:00 PM	192	752	6	1
79	11/16/2004	1:45:00 PM	190	746	5	0
80	11/16/2004	2:00:00 PM	179	738	8	2
81	11/16/2004	2:15:00 PM	152	713	5	0
82	11/16/2004	2:30:00 PM	151	672	0	1
83	11/16/2004	2:45:00 PM	198	680	4	1
84	11/16/2004	3:00:00 PM	192	693	4	1
85	11/16/2004	3:15:00 PM	175	716	3	0
86	11/16/2004	3:30:00 PM	170	735	4	1
87	11/16/2004	3:45:00 PM	214	751	1	0
88	11/16/2004	4:00:00 PM	203	762	3	1
89	11/16/2004	4:15:00 PM	189	776	8	0
90	11/16/2004	4:30:00 PM	218	824	7	1
91	11/16/2004	4:45:00 PM	208	818	4	0
92	11/16/2004	5:00:00 PM	211	826	3	1
93	11/16/2004	5:15:00 PM	233	870	2	0
94	11/16/2004	5:30:00 PM	199	851	3	1
95	11/16/2004	5:45:00 PM	221	864	2	0
96	11/16/2004	6:00:00 PM	184	837	5	1
97	11/16/2004	6:15:00 PM	184	788	1	0
98	11/16/2004	6:30:00 PM	208	797	1	1
99	11/16/2004	6:45:00 PM	172	748	1	0
100	11/16/2004	7:00:00 PM	145	709	0	1
101	11/16/2004	7:15:00 PM	147	672	1	0
102	11/16/2004	7:30:00 PM	120	584	0	1
103	11/16/2004	7:45:00 PM	111	523	0	0
104	11/16/2004	8:00:00 PM	116	494	1	1
105	11/16/2004	8:15:00 PM	100	447	1	0
106	11/16/2004	8:30:00 PM	79	406	0	1
107	11/16/2004	8:45:00 PM	103	398	1	0
108	11/16/2004	9:00:00 PM	74	356	0	0
109	11/16/2004	9:15:00 PM	84	340	2	0
110	11/16/2004	9:30:00 PM	83	344	2	1
111	11/16/2004	9:45:00 PM	71	312	2	0

112	11/16/2004	10:00:00 PM	64	302	0	0
113	11/16/2004	10:15:00 PM	71	289	1	0
114	11/16/2004	10:30:00 PM	57	263	0	1
115	11/16/2004	10:45:00 PM	41	233	0	0
116	11/16/2004	11:00:00 PM	56	225	0	0
117	11/16/2004	11:15:00 PM	36	190	0	0
118	11/16/2004	11:30:00 PM	39	172	0	1
119	11/16/2004	11:45:00 PM	38	169	0	0
120	11/17/2004	12:00:00 AM	24	137	0	0
121	11/17/2004	12:15:00 AM	23	124	2	1
122	11/17/2004	12:30:00 AM	14	99	0	0
123	11/17/2004	12:45:00 AM	23	84	0	0
124	11/17/2004	1:00:00 AM	18	78	0	0
125	11/17/2004	1:15:00 AM	11	66	0	0
126	11/17/2004	1:30:00 AM	4	56	1	0
127	11/17/2004	1:45:00 AM	7	40	0	0
128	11/17/2004	2:00:00 AM	12	34	1	0
129	11/17/2004	2:15:00 AM	12	35	0	0
130	11/17/2004	2:30:00 AM	4	35	0	0
131	11/17/2004	2:45:00 AM	4	32	0	0
132	11/17/2004	3:00:00 AM	4	24	0	0
133	11/17/2004	3:15:00 AM	5	17	0	0
134	11/17/2004	3:30:00 AM	3	16	0	0
135	11/17/2004	3:45:00 AM	7	19	0	0
136	11/17/2004	4:00:00 AM	8	23	0	0
137	11/17/2004	4:15:00 AM	4	22	0	0
138	11/17/2004	4:30:00 AM	8	27	0	0
139	11/17/2004	4:45:00 AM	13	33	0	0
140	11/17/2004	5:00:00 AM	9	34	0	0
141	11/17/2004	5:15:00 AM	13	43	0	0
142	11/17/2004	5:30:00 AM	18	53	1	0
143	11/17/2004	5:45:00 AM	19	59	1	0
144	11/17/2004	6:00:00 AM	25	75	6	0
145	11/17/2004	6:15:00 AM	35	97	4	0
146	11/17/2004	6:30:00 AM	69	148	2	0
147	11/17/2004	6:45:00 AM	106	235	6	2
148	11/17/2004	7:00:00 AM	101	311	3	0
149	11/17/2004	7:15:00 AM	125	401	6	0
150	11/17/2004	7:30:00 AM	206	538	10	0
151	11/17/2004	7:45:00 AM	203	635	7	0
152	11/17/2004	8:00:00 AM	184	718	7	0
153	11/17/2004	8:15:00 AM	178	771	3	0
154	11/17/2004	8:30:00 AM	192	757	6	0
155	11/17/2004	8:45:00 AM	184	738	5	3
156	11/17/2004	9:00:00 AM	150	704	7	1
157	11/17/2004	9:15:00 AM	139	665	8	3
158	11/17/2004	9:30:00 AM	144	617	6	1
159	11/17/2004	9:45:00 AM	164	597	3	0
160	11/17/2004	10:00:00 AM	151	598	9	3
161	11/17/2004	10:15:00 AM	121	580	3	0
162	11/17/2004	10:30:00 AM	146	582	4	2
163	11/17/2004	10:45:00 AM	156	574	9	0
164	11/17/2004	11:00:00 AM	148	571	4	1
165	11/17/2004	11:15:00 AM	152	602	5	0
166	11/17/2004	11:30:00 AM	195	651	2	2
167	11/17/2004	11:45:00 AM	197	692	8	0
168	11/17/2004	12:00:00 PM	227	771	11	0
169	11/17/2004	12:15:00 PM	205	824	10	1

PHF= 0.93

170	11/17/2004	12:30:00 PM	201	830	6	1
171	11/17/2004	12:45:00 PM	214	847	4	0
172	11/17/2004	1:00:00 PM	218	838	5	1
173	11/17/2004	1:15:00 PM	177	810	4	0
174	11/17/2004	1:30:00 PM	192	801	4	3
175	11/17/2004	1:45:00 PM	207	794	4	0
176	11/17/2004	2:00:00 PM	204	780	9	1
177	11/17/2004	2:15:00 PM	189	792	2	1
178	11/17/2004	2:30:00 PM	186	786	4	2
179	11/17/2004	2:45:00 PM	190	769	4	0
180	11/17/2004	3:00:00 PM	215	780	3	0
181	11/17/2004	3:15:00 PM	189	780	6	0
182	11/17/2004	3:30:00 PM	202	796	5	2
183	11/17/2004	3:45:00 PM	223	829	4	0
184	11/17/2004	4:00:00 PM	211	825	3	0
185	11/17/2004	4:15:00 PM	221	857	4	0
186	11/17/2004	4:30:00 PM	200	855	3	1
187	11/17/2004	4:45:00 PM	242	874	2	0
188	11/17/2004	5:00:00 PM	280	943	2	0
189	11/17/2004	5:15:00 PM	263	985	2	0
190	11/17/2004	5:30:00 PM	273	1058	6	1
191	11/17/2004	5:45:00 PM	205	1021	1	0
192	11/17/2004	6:00:00 PM	239	980	3	0
193	11/17/2004	6:15:00 PM	173	890	4	0
194	11/17/2004	6:30:00 PM	195	812	1	2
195	11/17/2004	6:45:00 PM	211	818	1	0
196	11/17/2004	7:00:00 PM	160	739	2	0
197	11/17/2004	7:15:00 PM	158	724	1	0
198	11/17/2004	7:30:00 PM	134	663	1	1
199	11/17/2004	7:45:00 PM	114	566	0	0
200	11/17/2004	8:00:00 PM	120	526	1	0
201	11/17/2004	8:15:00 PM	124	492	1	0
202	11/17/2004	8:30:00 PM	105	463	1	1
203	11/17/2004	8:45:00 PM	111	460	0	0
204	11/17/2004	9:00:00 PM	87	427	2	0
205	11/17/2004	9:15:00 PM	94	397	0	0
206	11/17/2004	9:30:00 PM	99	391	0	1
207	11/17/2004	9:45:00 PM	84	364	0	0
208	11/17/2004	10:00:00 PM	72	349	0	0
209	11/17/2004	10:15:00 PM	75	330	0	0
210	11/17/2004	10:30:00 PM	60	291	1	1
211	11/17/2004	10:45:00 PM	70	277	0	0
212	11/17/2004	11:00:00 PM	62	267	0	0
213	11/17/2004	11:15:00 PM	46	238	1	0
214	11/17/2004	11:30:00 PM	47	225	0	1
215	11/17/2004	11:45:00 PM	52	207	1	0
216	11/18/2004	12:00:00 AM	20	165	0	0
217	11/18/2004	12:15:00 AM	33	152	1	0
218	11/18/2004	12:30:00 AM	19	124	0	0
219	11/18/2004	12:45:00 AM	12	84	0	0
220	11/18/2004	1:00:00 AM	22	86	0	0
221	11/18/2004	1:15:00 AM	18	71	0	0
222	11/18/2004	1:30:00 AM	18	70	0	0
223	11/18/2004	1:45:00 AM	9	67	0	0
224	11/18/2004	2:00:00 AM	7	52	1	0
225	11/18/2004	2:15:00 AM	9	43	0	0
226	11/18/2004	2:30:00 AM	13	38	0	0
227	11/18/2004	2:45:00 AM	3	32	0	0

PHF=

0.94

11560

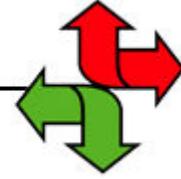
228	11/18/2004	3:00:00 AM	14	39	0	0
229	11/18/2004	3:15:00 AM	8	38	0	0
230	11/18/2004	3:30:00 AM	2	27	0	0
231	11/18/2004	3:45:00 AM	8	32	0	0
232	11/18/2004	4:00:00 AM	10	28	0	0
233	11/18/2004	4:15:00 AM	5	25	0	0
234	11/18/2004	4:30:00 AM	13	36	0	0
235	11/18/2004	4:45:00 AM	16	44	1	0
236	11/18/2004	5:00:00 AM	11	45	0	0
237	11/18/2004	5:15:00 AM	13	53	0	0
238	11/18/2004	5:30:00 AM	14	54	0	0
239	11/18/2004	5:45:00 AM	25	63	2	0
240	11/18/2004	6:00:00 AM	27	79	5	1
241	11/18/2004	6:15:00 AM	41	107	2	0
242	11/18/2004	6:30:00 AM	62	155	2	1
243	11/18/2004	6:45:00 AM	87	217	8	3
244	11/18/2004	7:00:00 AM	100	290	4	1
245	11/18/2004	7:15:00 AM	144	393	7	0
246	11/18/2004	7:30:00 AM	167	498	6	3
247	11/18/2004	7:45:00 AM	202	613	6	0
248	11/18/2004	8:00:00 AM	182	695	6	1
249	11/18/2004	8:15:00 AM	185	736	4	0
250	11/18/2004	8:30:00 AM	151	720	7	1
251	11/18/2004	8:45:00 AM	193	711	5	1
252	11/18/2004	9:00:00 AM	183	712	9	4
253	11/18/2004	9:15:00 AM	157	684	4	0
254	11/18/2004	9:30:00 AM	141	674	4	1
255	11/18/2004	9:45:00 AM	168	649	9	1
256	11/18/2004	10:00:00 AM	169	635	5	2
257	11/18/2004	10:15:00 AM	185	663	9	0
258	11/18/2004	10:30:00 AM	205	727	4	1
259	11/18/2004	10:45:00 AM	124	683	4	0
260	11/18/2004	11:00:00 AM	2	516	0	0
261	11/18/2004	11:15:00 AM	1	332	0	0
262	11/18/2004	11:30:00 AM	5	132	0	0
263	11/18/2004	11:45:00 AM	0	8	0	0
264	11/18/2004	12:00:00 PM	0	6	0	0
265	11/18/2004	12:15:00 PM	0	5	0	0
266	11/18/2004	12:30:00 PM	0	0	0	0
267	11/18/2004	12:45:00 PM	0	0	0	0
268	11/18/2004	1:00:00 PM	0	0	0	0
269	11/18/2004	1:15:00 PM	0	0	0	0
270	11/18/2004	1:30:00 PM	0	0	0	0
271	11/18/2004	1:45:00 PM	0	0	0	0
272	11/18/2004	2:00:00 PM	0	0	0	0
273	11/18/2004	2:15:00 PM	0	0	0	0
274	11/18/2004	2:30:00 PM	0	0	0	0
275	11/18/2004	2:45:00 PM	0	0	0	0
276	11/18/2004	3:00:00 PM	0	0	0	0
277	11/18/2004	3:15:00 PM	0	0	0	0
278	11/18/2004	3:30:00 PM	0	0	0	0
279	11/18/2004	3:45:00 PM	0	0	0	0
280	11/18/2004	4:00:00 PM	0	0	0	0
281	11/18/2004	4:15:00 PM	0	0	0	0
282	11/18/2004	4:30:00 PM	0	0	0	0
283	11/18/2004	4:45:00 PM	0	0	0	0
284	11/18/2004	5:00:00 PM	0	0	0	0
285	11/18/2004	5:15:00 PM	0	0	0	0

286	11/18/2004	5:30:00 PM	0	0	0	0
287	11/18/2004	5:45:00 PM	0	0	0	0
288	11/18/2004	6:00:00 PM	0	0	0	0
289	11/18/2004	6:15:00 PM	0	0	0	0
290	11/18/2004	6:30:00 PM	0	0	0	0
291	11/18/2004	6:45:00 PM	0	0	0	0
292	11/18/2004	7:00:00 PM	0	0	0	0
293	11/18/2004	7:15:00 PM	0	0	0	0
294	11/18/2004	7:30:00 PM	0	0	0	0
295	11/18/2004	7:45:00 PM	0	0	0	0
296	11/18/2004	8:00:00 PM	0	0	0	0
297	11/18/2004	8:15:00 PM	0	0	0	0
298	11/18/2004	8:30:00 PM	0	0	0	0
299	11/18/2004	8:45:00 PM	0	0	0	0
300	11/18/2004	9:00:00 PM	0	0	0	0
301	11/18/2004	9:15:00 PM	0	0	0	0
302	11/18/2004	9:30:00 PM	0	0	0	0
303	11/18/2004	9:45:00 PM	0	0	0	0
304	11/18/2004	10:00:00 PM	0	0	0	0
305	11/18/2004	10:15:00 PM	0	0	0	0
306	11/18/2004	10:30:00 PM	0	0	0	0
307	11/18/2004	10:45:00 PM	0	0	0	0
308	11/18/2004	11:00:00 PM	0	0	0	0
309	11/18/2004	11:15:00 PM	0	0	0	0
310	11/18/2004	11:30:00 PM	0	0	0	0
311	11/18/2004	11:45:00 PM	0	0	0	0
312	11/19/2004	12:00:00 AM	0	0	0	0
313	11/19/2004	12:15:00 AM	0	0	0	0
314	11/19/2004	12:30:00 AM	0	0	0	0
315	11/19/2004	12:45:00 AM	0	0	0	0
316	11/19/2004	1:00:00 AM	0	0	0	0
317	11/19/2004	1:15:00 AM	0	0	0	0
318	11/19/2004	1:30:00 AM	0	0	0	0
319	11/19/2004	1:45:00 AM	0	0	0	0
320	11/19/2004	2:00:00 AM	0	0	0	0
321	11/19/2004	2:15:00 AM	0	0	0	0
322	11/19/2004	2:30:00 AM	0	0	0	0
323	11/19/2004	2:45:00 AM	0	0	0	0
324	11/19/2004	3:00:00 AM	0	0	0	0
325	11/19/2004	3:15:00 AM	0	0	0	0
326	11/19/2004	3:30:00 AM	0	0	0	0
327	11/19/2004	3:45:00 AM	0	0	0	0
328	11/19/2004	4:00:00 AM	0	0	0	0
329	11/19/2004	4:15:00 AM	0	0	0	0
330	11/19/2004	4:30:00 AM	0	0	0	0
331	11/19/2004	4:45:00 AM	0	0	0	0
332	11/19/2004	5:00:00 AM	0	0	0	0
333	11/19/2004	5:15:00 AM	0	0	0	0
334	11/19/2004	5:30:00 AM	0	0	0	0
335	11/19/2004	5:45:00 AM	0	0	0	0
336	11/19/2004	6:00:00 AM	0	0	0	0
337	11/19/2004	6:15:00 AM	0	0	0	0
338	11/19/2004	6:30:00 AM	0	0	0	0
339	11/19/2004	6:45:00 AM	0	0	0	0
340	11/19/2004	7:00:00 AM	0	0	0	0
341	11/19/2004	7:15:00 AM	0	0	0	0
342	11/19/2004	7:30:00 AM	0	0	0	0
343	11/19/2004	7:45:00 AM	0	0	0	0

344	11/19/2004	8:00:00 AM	0	0	0	0
345	11/19/2004	8:15:00 AM	0	0	0	0
346	11/19/2004	8:30:00 AM	0	0	0	0
347	11/19/2004	8:45:00 AM	0	0	0	0
348	11/19/2004	9:00:00 AM	0	0	0	0
349	11/19/2004	9:15:00 AM	0	0	0	0
350	11/19/2004	9:30:00 AM	0	0	0	0
351	11/19/2004	9:45:00 AM	0	0	0	0
352	11/19/2004	10:00:00 AM	0	0	0	0
353	11/19/2004	10:15:00 AM	0	0	0	0
354	11/19/2004	10:30:00 AM	0	0	0	0
355	11/19/2004	10:45:00 AM	0	0	0	0
356	11/19/2004	11:00:00 AM	0	0	0	0
357	11/19/2004	11:15:00 AM	0	0	0	0
358	11/19/2004	11:30:00 AM	0	0	0	0
359	11/19/2004	11:45:00 AM	0	0	0	0
360	11/19/2004	12:00:00 PM	0	0	0	0
361	11/19/2004	12:15:00 PM	0	0	0	0
362	11/19/2004	12:30:00 PM	0	0	0	0
363	11/19/2004	12:45:00 PM	0	0	0	0
364	11/19/2004	1:00:00 PM	0	0	0	0

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Knowledge

Chapter 4C. Traffic Control Signal Needs Studies

Section 4C.01 Studies and Factors for Justifying Traffic Control Signals

Standard:

An engineering study of traffic conditions, pedestrian characteristics, and physical characteristics of the location shall be performed to determine whether installation of a traffic control signal is justified at a particular location.

The investigation of the need for a traffic control signal shall include an analysis of the applicable factors contained in the following traffic signal warrants and other factors related to existing operation and safety at the study location:

- Warrant 1, Eight-Hour Vehicular Volume.**
- Warrant 2, Four-Hour Vehicular Volume.**
- Warrant 3, Peak Hour.**
- Warrant 4, Pedestrian Volume.**
- Warrant 5, School Crossing.**
- Warrant 6, Coordinated Signal System.**
- Warrant 7, Crash Experience.**
- Warrant 8, Roadway Network.**

The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal.

Support:

Sections [8D.07](#) and [10D.05](#) contain information regarding the use of traffic control signals instead of gates and/or flashing light signals at highway-railroad grade crossings and highway-light rail transit grade crossings, respectively.

Guidance:

A traffic control signal should not be installed unless one or more of the factors described in this Chapter are met.

A traffic control signal should not be installed unless an engineering study indicates that installing a traffic control signal will improve the overall safety and/or operation of the intersection.

A traffic control signal should not be installed if it will seriously disrupt progressive traffic flow.

The study should consider the effects of the right-turn vehicles from the minor-street approaches. Engineering judgment should be used to determine what, if any, portion of the right-turn traffic is subtracted from the minor-street traffic count when evaluating the count

against the above signal warrants.

Engineering judgment should also be used in applying various traffic signal warrants to cases where approaches consist of one lane plus one left-turn or right-turn lane. The site-specific traffic characteristics dictate whether an approach should be considered as one lane or two lanes. For example, for an approach with one lane for through and right-turning traffic plus a left-turn lane, engineering judgment could indicate that it should be considered a one-lane approach if the traffic using the left-turn lane is minor. In such a case, the total traffic volume approaching the intersection should be applied against the signal warrants as a one-lane approach. The approach should be considered two lanes if approximately half of the traffic on the approach turns left and the left-turn lane is of sufficient length to accommodate all left-turn vehicles.

Similar engineering judgment and rationale should be applied to a street approach with one lane plus a right-turn lane. In this case, the degree of conflict of minor-street right-turn traffic with traffic on the major street should be considered. Thus, right-turn traffic should not be included in the minor-street volume if the movement enters the major street with minimal conflict. The approach should be evaluated as a one-lane approach with only the traffic volume in the through/left-turn lane considered.

At a location that is under development or construction and where it is not possible to obtain a traffic count that would represent future traffic conditions, hourly volumes should be estimated as part of an engineering study for comparison with traffic signal warrants. Except for locations where the engineering study uses the satisfaction of Warrant 8 to justify a signal, a traffic control signal installed under projected conditions should have an engineering study done within 1 year of putting the signal into stop-and-go operation to determine if the signal is justified. If not justified, the signal should be taken out of stop-and-go operation or removed.

For signal warrant analysis, a location with a wide median, even if the median width is greater than 9 m (30 ft), should be considered as one intersection.

Option:

At an intersection with a high volume of left-turn traffic from the major street, the signal warrant analysis may be performed in a manner that considers the higher of the major-street left-turn volumes as the "minor-street" volume and the corresponding single direction of opposing traffic on the major street as the "major-street" volume.

For signal warrant analysis, bicyclists may be counted as either vehicles or pedestrians.

Support:

When performing a signal warrant analysis, bicyclists riding in the street with other vehicular traffic are usually counted as vehicles and bicyclists who are clearly using pedestrian facilities are usually counted as pedestrians.

Option:

Engineering study data may include the following:

- A. The number of vehicles entering the intersection in each hour from each approach during 12 hours of an average day. It is desirable that the hours selected contain the greatest percentage of the 24-hour traffic volume.
- B. Vehicular volumes for each traffic movement from each approach, classified by vehicle type (heavy trucks, passenger cars and light trucks, public-transit vehicles, and, in some locations, bicycles), during each 15-minute period of the 2 hours in the morning and 2 hours in the afternoon during which total traffic entering the intersection is greatest.

- C. Pedestrian volume counts on each crosswalk during the same periods as the vehicular counts in Item B above and during hours of highest pedestrian volume. Where young, elderly, and/or persons with physical or visual disabilities need special consideration, the pedestrians and their crossing times may be classified by general observation.
- D. Information about nearby facilities and activity centers that serve the young, elderly, and/or persons with disabilities, including requests from persons with disabilities for accessible crossing improvements at the location under study. These persons might not be adequately reflected in the pedestrian volume count if the absence of a signal restrains their mobility.
- E. The posted or statutory speed limit or the 85th-percentile speed on the uncontrolled approaches to the location.
- F. A condition diagram showing details of the physical layout, including such features as intersection geometrics, channelization, grades, sight-distance restrictions, transit stops and routes, parking conditions, pavement markings, roadway lighting, driveways, nearby railroad crossings, distance to nearest traffic control signals, utility poles and fixtures, and adjacent land use.
- G. A collision diagram showing crash experience by type, location, direction of movement, severity, weather, time of day, date, and day of week for at least 1 year.

The following data, which are desirable for a more precise understanding of the operation of the intersection, may be obtained during the periods specified in Item B of the preceding paragraph:

- A. Vehicle-hours of stopped time delay determined separately for each approach.
- B. The number and distribution of acceptable gaps in vehicular traffic on the major street for entrance from the minor street.
- C. The posted or statutory speed limit or the 85th-percentile speed on controlled approaches at a point near to the intersection but unaffected by the control.
- D. Pedestrian delay time for at least two 30-minute peak pedestrian delay periods of an average weekday or like periods of a Saturday or Sunday.
- E. Queue length on stop-controlled approaches.

Section 4C.02 Warrant 1, Eight-Hour Vehicular Volume

Support:

The Minimum Vehicular Volume, Condition A, is intended for application at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic control signal.

The Interruption of Continuous Traffic, Condition B, is intended for application at locations where Condition A is not satisfied and where the traffic volume on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay or conflict in entering or crossing the major street.

It is intended that Warrant 1 be treated as a single warrant. If Condition A is satisfied, then the criteria for Warrant 1 is satisfied and Condition B and the combination of Conditions A and B are not needed. Similarly, if Condition B is satisfied, then the criteria for Warrant 1 is satisfied and the combination of Conditions A and B is not needed.

Standard:

The need for a traffic control signal shall be considered if an engineering study finds that one of the following conditions exist for each of any 8 hours of an average day:

- A. The vehicles per hour given in both of the 100 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; or**

- B. The vehicles per hour given in both of the 100 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.

In applying each condition the major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of these 8 hours.

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A—Minimum Vehicular Volume									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%^a	80%^b	70%^c	56%^d	100%^a	80%^b	70%^c	56%^d
1.....	1.....	500	400	350	280	150	120	105	84
2 or more.....	1.....	600	480	420	336	150	120	105	84
2 or more.....	2 or more.....	600	480	420	336	200	160	140	112
1.....	2 or more.....	500	400	350	280	200	160	140	112

Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition B—Interruption of Continuous Traffic									
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%^a	80%^b	70%^c	56%^d	100%^a	80%^b	70%^c	56%^d
1.....	1.....	750	600	525	420	75	60	53	42
2 or more.....	1.....	900	720	630	504	75	60	53	42
2 or more.....	2 or more.....	900	720	630	504	100	80	70	56
1.....	2 or more.....	750	600	525	420	100	80	70	56

^a Basic minimum hourly volume.

^b Used for combination of Conditions A and B after adequate trial of other remedial measures.

^c May be used when the major-street speed exceeds 70 km/h or exceeds 40 mph or in an isolated community with a population of less than 10,000.

^d May be used for combination of Conditions A and B after adequate trial of other remedial measures when the major-street speed exceeds 70 km/h or exceeds 40 mph or in an isolated community with a population of less than 10,000.

Option:

If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 70 km/h or exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the traffic volumes in the 70 percent columns in Table 4C-1 may be used in place of the 100 percent columns.

Guidance:

The combination of Conditions A and B is intended for application at locations where Condition A is not satisfied and Condition B is not satisfied and should be applied only after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems.

Standard:

The need for a traffic control signal shall be considered if an engineering study finds that both of the following conditions exist for each of any 8 hours of an average day:

- A. **The vehicles per hour given in both of the 80 percent columns of Condition A in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; and**
- B. **The vehicles per hour given in both of the 80 percent columns of Condition B in Table 4C-1 exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.**

These major-street and minor-street volumes shall be for the same 8 hours for each condition; however, the 8 hours satisfied in Condition A shall not be required to be the same 8 hours satisfied in Condition B. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours.

Option:

If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 70 km/h or exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the traffic volumes in the 56 percent columns in Table 4C-1 may be used in place of the 80 percent columns.

Section 4C.03 Warrant 2, Four-Hour Vehicular Volume

Support:

The Four-Hour Vehicular Volume signal warrant conditions are intended to be applied where the volume of intersecting traffic is the principal reason to consider installing a traffic control signal.

Standard:

The need for a traffic control signal shall be considered if an engineering study finds that, for each of any 4 hours of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) all fall above the applicable curve in Figure 4C-1 for the existing combination of approach lanes. On the minor street, the higher volume shall not be required to be on the same approach during each of these 4 hours.

Option:

If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 70 km/h or exceeds 40 mph or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 4C-2 may be used in place of Figure 4C-1.

Figure 4C-1 Warrant 2, Four-Hour Vehicular Volume

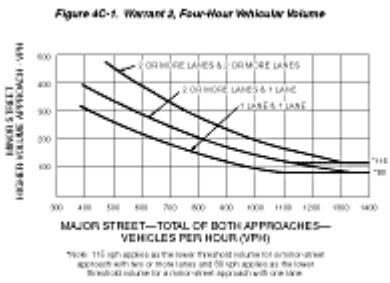
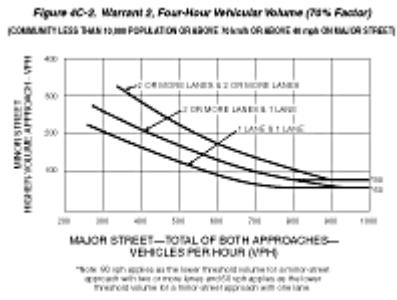


Figure 4C-2 Warrant 2, Four-Hour Vehicular Volume (70% Factor)



Section 4C.04 Warrant 3, Peak Hour

Support:

The Peak Hour signal warrant is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street.

Standard:

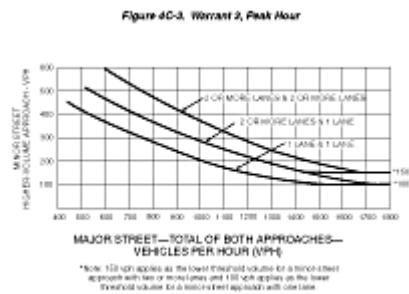
This signal warrant shall be applied only in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

The need for a traffic control signal shall be considered if an engineering study finds that the criteria in either of the following two categories are met:

- A. **If all three of the following conditions exist for the same 1 hour (any four consecutive 15-minute periods) of an average day:**
 1. **The total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equals or exceeds: 4 vehicle-hours for a one-lane approach; or 5 vehicle-hours for a two-lane approach, and**
 2. **The volume on the same minor-street approach (one direction only) equals or exceeds 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes, and**
 3. **The total entering volume serviced during the hour equals or exceeds 650 vehicles per hour for intersections with three approaches or 800 vehicles per hour for intersections with four or more approaches.**
- B. **The plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4C-3 for the existing combination of approach lanes.**

Option:

If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 70 km/h or exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 4C-4 may be used in place of Figure 4C-3 to satisfy the criteria in the second category of the Standard.

Figure 4C-3 Warrant 3, Peak Hour**Figure 4C-4 Warrant 3, Peak Hour (70% Factor)****Section 4C.05 Warrant 4, Pedestrian Volume****Support:**

The Pedestrian Volume signal warrant is intended for application where the traffic volume on a major street is so heavy that pedestrians experience excessive delay in crossing the major street.

Standard:

The need for a traffic control signal at an intersection or midblock crossing shall be considered if an engineering study finds that both of the following criteria are met:

- The pedestrian volume crossing the major street at an intersection or midblock location during an average day is 100 or more for each of any 4 hours or 190 or more during any 1 hour; and**
- There are fewer than 60 gaps per hour in the traffic stream of adequate length to allow pedestrians to cross during the same period when the pedestrian volume criterion is satisfied. Where there is a divided street having a median of sufficient width for pedestrians to wait, the requirement applies separately to each direction of vehicular traffic.**

The Pedestrian Volume signal warrant shall not be applied at locations where the distance to the nearest traffic control signal along the major street is less than 90 m (300 ft), unless the proposed traffic control signal will not restrict the progressive movement of traffic.

If this warrant is met and a traffic control signal is justified by an engineering study, the traffic control signal shall be equipped with pedestrian signal heads conforming to requirements set forth in [Chapter 4E](#).

Guidance:

If this warrant is met and a traffic control signal is justified by an engineering study, then:

- A. If at an intersection, the traffic control signal should be traffic-actuated and should include pedestrian detectors.
- B. If at a nonintersection crossing, the traffic control signal should be pedestrian-actuated, parking and other sight obstructions should be prohibited for at least 30 m (100 ft) in advance of and at least 6.1 m (20 ft) beyond the crosswalk, and the installation should include suitable standard signs and pavement markings.
- C. Furthermore, if installed within a signal system, the traffic control signal should be coordinated.

Option:

The criterion for the pedestrian volume crossing the major roadway may be reduced as much as 50 percent if the average crossing speed of pedestrians is less than 1.2 m/sec (4 ft/sec).

A traffic control signal may not be needed at the study location if adjacent coordinated traffic control signals consistently provide gaps of adequate length for pedestrians to cross the street, even if the rate of gap occurrence is less than one per minute.

Section 4C.06 Warrant 5, School Crossing

Support:

The School Crossing signal warrant is intended for application where the fact that school children cross the major street is the principal reason to consider installing a traffic control signal.

Standard:

The need for a traffic control signal shall be considered when an engineering study of the frequency and adequacy of gaps in the vehicular traffic stream as related to the number and size of groups of school children at an established school crossing across the major street shows that the number of adequate gaps in the traffic stream during the period when the children are using the crossing is less than the number of minutes in the same period (see [Section 7A.03](#)) and there are a minimum of 20 students during the highest crossing hour.

Before a decision is made to install a traffic control signal, consideration shall be given to the implementation of other remedial measures, such as warning signs and flashers, school speed zones, school crossing guards, or a grade-separated crossing.

The School Crossing signal warrant shall not be applied at locations where the distance to the nearest traffic control signal along the major street is less than 90 m (300 ft), unless the proposed traffic control signal will not restrict the progressive movement of traffic.

Guidance:

If this warrant is met and a traffic control signal is justified by an engineering study, then:

- A. If at an intersection, the traffic control signal should be traffic-actuated and should include pedestrian detectors.

- B. If at a nonintersection crossing, the traffic control signal should be pedestrian-actuated, parking and other sight obstructions should be prohibited for at least 30 m (100 ft) in advance of and at least 6.1 m (20 ft) beyond the crosswalk, and the installation should include suitable standard signs and pavement markings.
- C. Furthermore, if installed within a signal system, the traffic control signal should be coordinated.

Section 4C.07 Warrant 6, Coordinated Signal System

Support:

Progressive movement in a coordinated signal system sometimes necessitates installing traffic control signals at intersections where they would not otherwise be needed in order to maintain proper platooning of vehicles.

Standard:

The need for a traffic control signal shall be considered if an engineering study finds that one of the following criteria is met:

- A. **On a one-way street or a street that has traffic predominantly in one direction, the adjacent traffic control signals are so far apart that they do not provide the necessary degree of vehicular platooning.**
- B. **On a two-way street, adjacent traffic control signals do not provide the necessary degree of platooning and the proposed and adjacent traffic control signals will collectively provide a progressive operation.**

Guidance:

The Coordinated Signal System signal warrant should not be applied where the resultant spacing of traffic control signals would be less than 300 m (1,000 ft).

Section 4C.08 Warrant 7, Crash Experience

Support:

The Crash Experience signal warrant conditions are intended for application where the severity and frequency of crashes are the principal reasons to consider installing a traffic control signal.

Standard:

The need for a traffic control signal shall be considered if an engineering study finds that all of the following criteria are met:

- A. **Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency; and**
- B. **Five or more reported crashes, of types susceptible to correction by a traffic control signal, have occurred within a 12-month period, each crash involving personal injury or property damage apparently exceeding the applicable requirements for a reportable crash; and**
- C. **For each of any 8 hours of an average day, the vehicles per hour (vph) given in both of the 80 percent columns of Condition A in [Table 4C-1](#) (see [Section 4C.02](#)), or the vph in both of the 80 percent columns of Condition B in [Table 4C-1](#) exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection, or the volume of pedestrian traffic is not less than 80 percent of the requirements specified in the Pedestrian Volume warrant. These major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours.**

Option:

If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 70 km/h or exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the traffic volumes in the 56 percent columns in Table 4C-1 may be used in place of the 80 percent columns.

Section 4C.09 Warrant 8, Roadway Network**Support:**

Installing a traffic control signal at some intersections might be justified to encourage concentration and organization of traffic flow on a roadway network.

Standard:

The need for a traffic control signal shall be considered if an engineering study finds that the common intersection of two or more major routes meets one or both of the following criteria:

- A. **The intersection has a total existing, or immediately projected, entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday and has 5-year projected traffic volumes, based on an engineering study, that meet one or more of Warrants 1, 2, and 3 during an average weekday; or**
- B. **The intersection has a total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of any 5 hours of a nonnormal business day (Saturday or Sunday).**

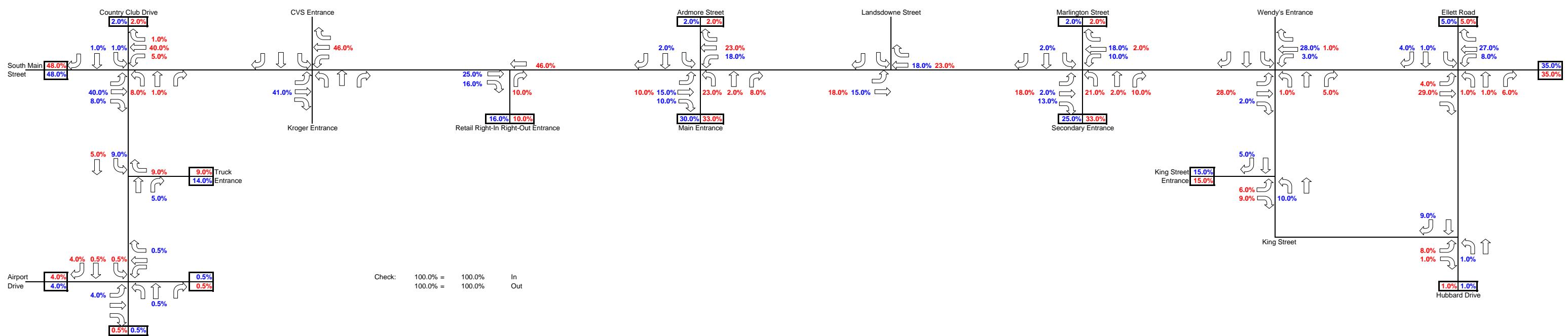
A major route as used in this signal warrant shall have one or more of the following characteristics:

- A. **It is part of the street or highway system that serves as the principal roadway network for through traffic flow; or**
- B. **It includes rural or suburban highways outside, entering, or traversing a City; or**
- C. **It appears as a major route on an official plan, such as a major street plan in an urban area traffic and transportation study.**

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Appendix F

Trip Generation Split Assumptions



Anderson &
Associates, Inc.
Blacksburg, VA

Date: 23-Apr-07
JN: 22559.41
Scale NTS

First & Main, Blacksburg - Traffic Impact Study
Blacksburg, Virginia

Appendix F Midday & PM Trip Generation
Distribution Movement
Percentages (2008)